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The IRON AGE

ESTABLISHED 1855

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April 13, 1944

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Freedom Rings the Bell

WHAT was it that enabled us, in less than three years, to perform the "miracle of production" and become the world's Arsenal of Democracy as well as its hope for postwar reconstruction?

Superior productivity did it; productivity that has been nurtured in a soil of freedom for nearly a century. Management and men and machines work better together in America than in any other country. Our shipbuilders have four times the productivity per manhour than those of any other land and there are few important industries, if any, where we do not hold an advantage of two to one or better.

It is worth looking for the reason for this superiority so that we may keep it alive in the years to come.

It is not because we have superior natural resources. Those of Russia and Africa far exceed ours. It is not population nor population growth. Witness the teeming millions of China or India. It is not availability of producing equipment. We have always been willing to sell, more recently even to give away our latest and best.

Our superior productivity does not rest upon a monopoly of means, or materials or manpower. The reason for it is that the fundamental urge for freedom, which has made America what it is, has been carried over into our daily work for our daily bread. And free labor will outproduce slave labor anywhere at anytime.

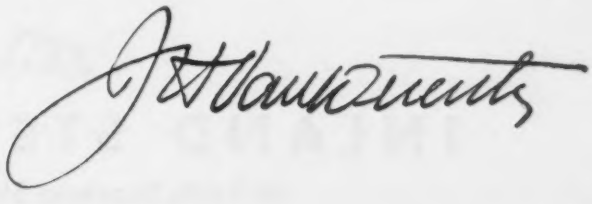
Slavery does not necessarily mean the physical ownership of one person by another. Even more insidious forms of it are expressed in fascism or socialism in which the people sell themselves to the state in return for a promised, but perhaps not delivered, security, facing the future thereafter, like civil service employees, without much fear but also without much hope.

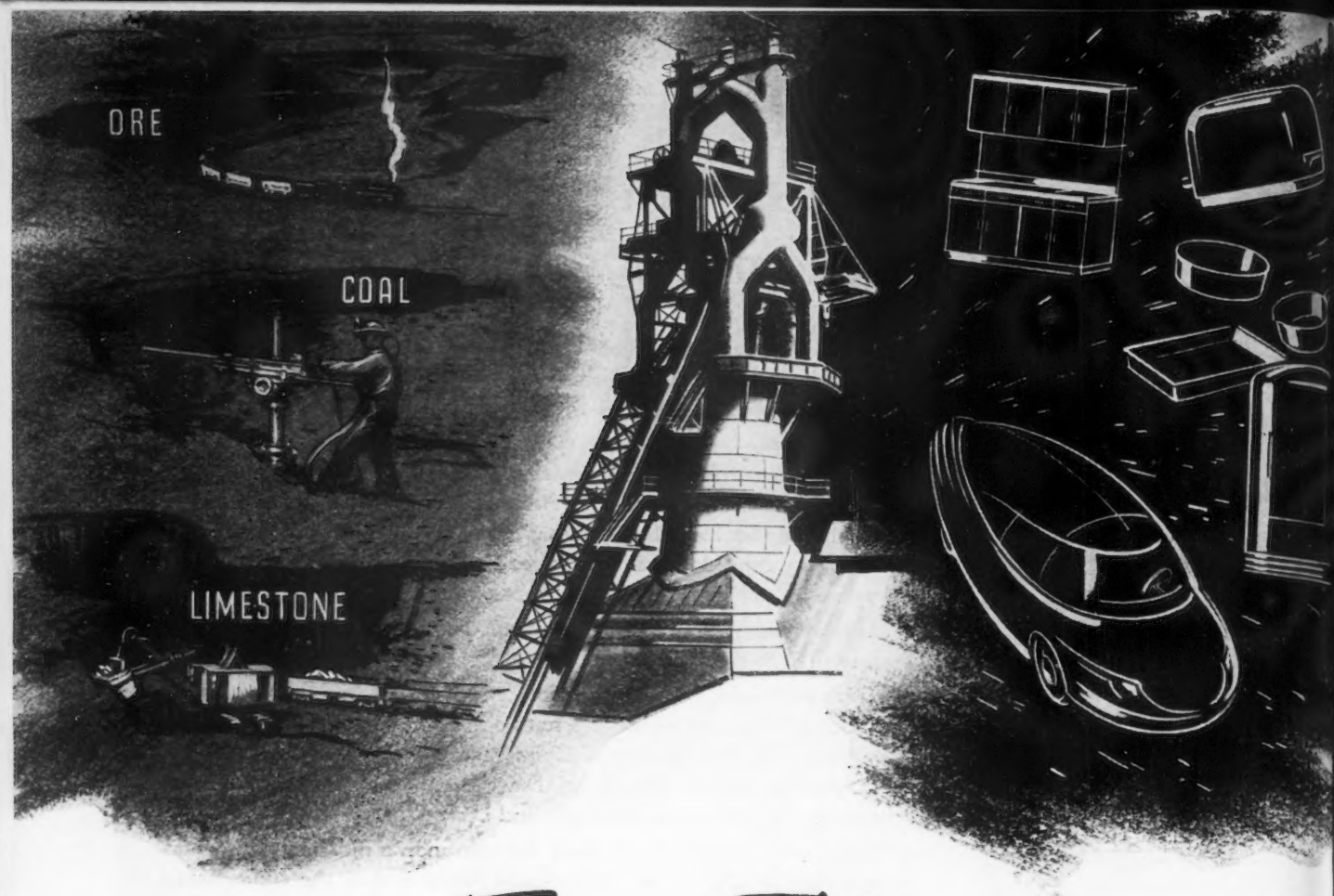
Monopolies and cartels are instruments of enslavement, as are colonial exploitations by "master races" however labeled. So also is the sale for a few cents per day of the right to exercise thought and will by the Zombies who fall beneath the yoke of the union racketeer.

Most insidious of all forms of self-enslavement is the hero worship of the indispensable man, so common and so unfortunate today and the chief cause of the world's troubles, in Germany, Italy, Japan; yes even in America.

When freedom reigns in America our productive superiority will be unchallenged. But when our productivity per manhour falters, watch out for our freedom. And it has been faltering for a year or more. True, our total volume of output has steadily increased but with disproportionate effort. But in many industries, steel included, *output per manhour* is 15 to 30 per cent less than a year ago.

Maybe it's time again to ring the Liberty Bell.





Finer Things
Are Coming Out of the Ground

From the ore ranges, the coal fields, and the limestone beds are coming vast quantities of blended iron ore, coking coal, and purest limestone—the principal ingredients for making steel, the "master metal" in both peace and war.

Today this steel must all go into the production of the materiel of war, but tomorrow, when Victory is ours, finer things will come to us from out of the ground because of improvements now being made in steel.

Inland metallurgists are constantly testing and re-testing, melting and re-melting, adding one element and taking away another—always seeking for something better. Already they have contributed many new methods and new steels to production for war.

These, and the newer methods and Inland steels that are sure to come from continued intensive research, will help you meet the needs of America at peace.

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The IRON AGE

APRIL 13, 1944

NEWS FRONT

► The early policy of Air Force procurement officials of excessive replacement ordering has resulted in tremendous stocks of items like piston rings and bearings. Much of this stock now has only one use to the original manufacturers--as scrap.

► To Howard Bruce, deputy director of materiel, Army Service Forces, the value of total stocks of surplus goods has been exaggerated. About $2\frac{1}{2}$ billion worth of surplus materials have a conceivable civilian use, not the $5 to $50 billion previously estimated.

► The great success with use of a 75 mm. cannon on the Mitchell airplane in the Pacific and the Marauder in Europe, is leading to the development of a 105 mm. cannon by the United Nations for installation in aircraft.

► There's talk going the rounds regarding the likelihood of E. R. Stettinius ending up as Democratic nominee for President in place of Roosevelt. Such a move would imply sponsorship by Roosevelt, and would be based on Stettinius' experience in world affairs, and acceptability by certain factions in business and labor.

► Henry Kaiser's automotive division has moved from Detroit to Bristol, Pa., home of the Fleetwings Division of Kaiser Cargo, Inc., where development is continuing on a military vehicle designed by Karl Probst.

This move, however, carries the connotation of declining interest.

► In Canada, a small percentage of aircraft production is gradually swinging from fighting aircraft to those in the civilian category. Manufacture of the four-engined Douglas DC-4 plane, selected for the main trans-Canadian airline operation, has already begun in the government owned Victory Aircraft, Ltd. and Canadian Vickers.

The plane will not be released to Canadian airlines, however, until new planes of similar type are released to domestic airlines in the United States.

► If the Ploesti oil fields in Rumania were captured or cut off, Foreign Economic Administrator Crowley says that the loss of oil would be serious, and the loss of Russian manganese and chrome from Turkey and the Balkans will have an immediate and serious effect on Germany's steel output.

► Since this country is now tooled up for war production, the WPB machine tools labor advisory committee asks that the free facilities of the industry be shifted to the manufacture of critically needed components and the production of new tools to replace obsolete equipment.

The labor committee opposes the postwar sale of government owned machine tools in any manner that will enable corporations or private traders to buy such tools for future production or speculation.

► A mock-up of Douglas Aircraft Co.'s new super-transport, the DC-7, has been unveiled. The plane will be powered by four engines, probably radial in design and multi-banked to develop an estimated 3000 hp. Cruising range is estimated at 4000 miles with speed over 400 miles an hr. and a service ceiling of about 40,000 ft.

Consolidated Vultee also has announced its new 48 passenger transport plane (company model 39), a prototype of which will be flying late this month. Gross weight will be 56,000 lb., cruising speed will be 240 miles per hr., and maximum range will be 4000 miles. Power will be supplied by four 1100 hp. Pratt & Whitney engines.

► By welding many airframe parts for the B-24 bomber, instead of riveting, Ford at Willow Run has been able to save 90 manhours per plane.

Parts spot welded are limited to those not subject to maximum vibration and which can be held together in Cleco fasteners. Most of the work is done with resistance welders.

► British experiments with diamond tools indicate that aluminum aircraft pistons can be turned with a surface finish of 1 1/8 to 2 3/4 micro-in. For best results machines should be properly mounted and all possible steps taken to eliminate vibration. Also, the tool must have a perfectly polished cutting edge with no fault apparent at 100 diameters.

Sub-zero Treatment of High S

At the present writing the principles and theories of sub-zero treatment published in the technical literature have been variable and sometimes confusing. Very few of the investigators agree on processing methods or specific metallurgical aspects of the phenomenon. However, all are agreed that the process does increase the productive life of a high speed steel cutting tool. The amount of this increase will vary on different types of cutting jobs, but it can be safely stated that an increase of 40 per cent in productivity may be expected over the average. Although the scope of sub-zero treatments cover almost all the structural metals and tool steels—even reaching into the realm of the plastics—this paper will deal entirely with the metallurgical aspects and results of the process on high speed steel used for metal cutting.

Although there is little agreement between contemporary investigators as to the proper place in the hardening operation to expose the tool to sub-zero treatment, it is believed that this discrepancy is due to fluctuations in the method of prior treatment. Even results obtained from ordinary treatments of high speed steel will vary in different hardening rooms. This phenomenon is probably due to a slight difference in the details of the hardening operation, and not in the actual austenitizing temperatures used. Since it is reasonable to believe that prior treatment has an effect on the results of sub-zero treating, it follows that different investigators could very easily obtain different results or obtain similar results on different applications of the sub-zero treatment.

The author has attempted to investigate the refrigeration of high speed steel from many angles, the objective being the most economic treatment that will give desirable results. Because of the obvious cracking hazard involved, the cold treatment following directly after the quench[1,2] was believed to be uneconomical. However, this method was included in the investigations and given a thorough trial. The materials used in the investigation were donated by the Latrobe Electric Steel Co. for the purposes of research. Table I lists the seven different types used in the original investigation. Since Steel No. 1 is more widely used than any other high speed steel today, it was selected to run the gauntlet of treatments. The treatments that this material was subjected to are listed as follows:

TYPE A

Preheat at 1600 deg. F. Quench from 2225 deg. F. into salt at 1050 deg. F. Cool in air to 100 deg. to 150 deg. F. Wash in hot water. Double temper at 1050 deg. F —2 hr. +2 hr.

TYPE B

Preheat at 1600 deg. F. Quench from 2225 deg. F. into salt at 1050

[1] P. Gordon and M. Cohen, "The Transformation of Retained Austenite in High Speed Steel at Sub-atmospheric Temperatures," Transactions, American Society for Metals, September, 1942, Vol. 30, pp. 569-591.

[2] G. B. Berlien, "Sub-zero Hardening Cycles," steel, Jan. 10, 1944, pp. 86-90.

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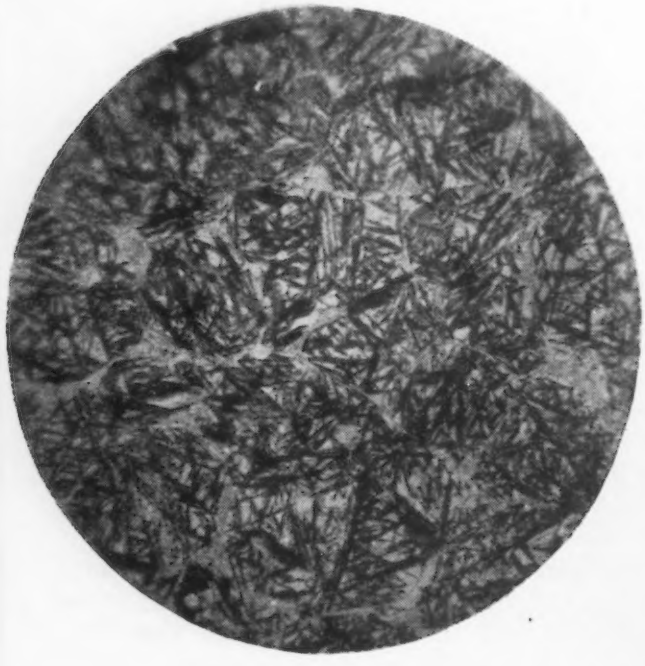

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FIG. 1—Steel No. 3; etch, Aqua Regia; magnification, 600 diameters; treatment, Type A; austenitized at 2300 deg. F.

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RIGHT

FIG. 2—Steel No. 3; etch, Aqua Regia; magnification, 600 diameters; treatment, Type D; austenitized at 2300 deg. F.

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Speed Steels

STEWART M. DePOY
Metallurgist, Delco Products Division, General Motors Corp., Dayton

deg. F. Cool in air to 100 deg. to 150 deg. F. Wash in hot water. Supercool to —110 deg. F. for 2 hrs. Warm to approximately 20 deg. F. Double temper at 1050 deg. F. —2 hr. + hr.

TYPE C

Preheat at 1600 deg. F. Quench from 2225 deg. F. into salt at 600 deg. F.[1] Hold at 600 deg. F. for 3 hr. Cool to 100 deg. to 150 deg. F. Wash in hot water. Supercool to —110 deg. F. for 2 hr. Warm to approximately 200 deg. F. Double temper at 1050 deg. F. —2 hr. +2 hr.

TYPE D

Preheat at 1600 deg. F. Quench from 2225 deg. F. into salt at 1050 deg. F. Cool in air to 100 deg. to 150 deg. F. Temper 2 hr. at 1050 deg. F. Cool in air to 100 deg. F. Supercool to —110 deg. F. for 2 hr. Warm to approximately 20 deg. F. Temper 2 hr. at 1050 deg. F.

TYPE E

Preheat at 1600 deg. F. Quench from 2225 deg. F. into salt at 600 deg. F.[1] Hold at 600 deg. F. for 3 hr. Cool to 100 deg. to 150 deg. F. Wash in hot water. Temper at 1050 deg. F. for 2 hr. Supercool to —110 deg. F. for 2 hr. Retemper at 1050 deg. F. for 2 hr.

TYPE F

Preheat at 1600 deg. F. Quench from 2225 deg. F. into salt at 1050 deg. F. Cool in air to 100 deg. to 150 deg. F. Double temper at 1050 deg. F. +2 hr. — hr. Supercool to —110 deg. F. for 2 hr.

The above treatments were originally used on ⅝ in. tool bits from Steel No. 1. These tool bits were put into service on A.M.S. 6380 steel which was heat-treated to 38-41c Rockwell hardness. The tool operated under the following cutting conditions: Speed, 45 ft. per min.; feed, 40.007 in. per revolution; depth of cut, 0.250 in. Using the Type A treated tool as a criterion, the increased production obtained by the remaining treatments were as follows: Type B, 17.5 per cent; Type C, 22.8 per cent; Type D, 45.7 per cent; Type E, 28.1 per cent; Type F, 31.5 per cent. It is interesting to note that Type D treatment gives by far the best results, and Type B, the hazardous treatment, gives the poorest results. It must not be construed by the reader that Type B will always show these low comparative results. At least one other investigator has obtained his best results by refrigerating directly after the quench.[2] However, it is believed that the Type D treatment will give at least as good results as any of the others, and it is obviously the most desirable treatment for use in the ordinary hardening department.

After arriving at what seemed to be the best place in the hardening operation to insert the sub-zero treatment, the investigation of the effect of grain size and amount of carbide solution seemed to be the next logical step. Consequently, the seven different types of steel were subjected to Treatments Type A and D. Table II lists the steels, their hardening temperatures, and the hardness, impact value, and grain count obtained. The results of cutting tests conducted on these treated steels show Steel No. 1, hardened at 2275 deg. F. and sub-zero treated, Steel No. 3, hardened at 2300 deg. F. and sub-zero treated, and Steel No. 7, hardened at 2410 deg. F. and sub-zero treated, to have the longest life. The comparative tools, treated by Type A treatment gave about 40 per cent less cutting life on Steels Nos. 1, 3, and 7. The cutting tests were run at 230 to 240 ft. per min. on N.E. 8620 Steel at 240 B.H.N. At this writing accurate results have not been obtained on Steels No. 2 and No.

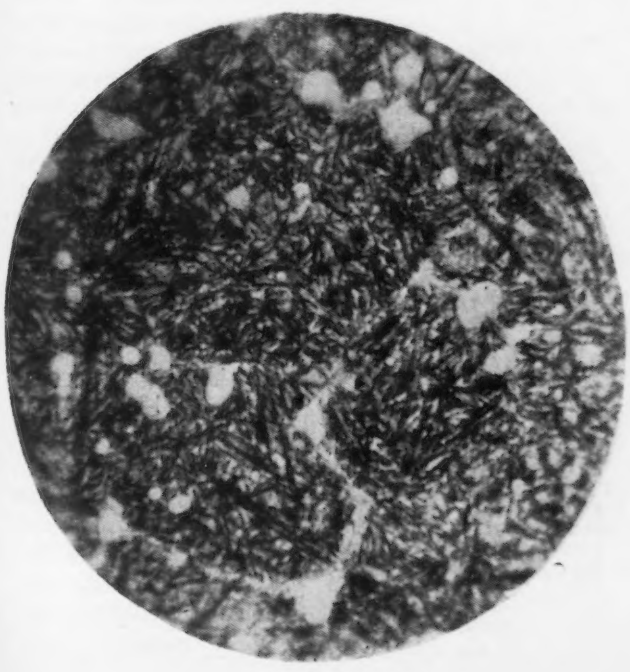

FIG. 3—Steel No 1; etch, Aqua Regia; magnification, 1250 diameters; treatment, Type A; austenitized at 2275 deg. F.

. . . The author points out that important increases in tool life may be obtained regardless of how refrigeration is used, and if followed by a sufficient temper to relieve the tremendous internal strains caused by the process. It is believed that refrigeration of – 100 deg. F. or lower is necessary to produce marked change in high speed steel.

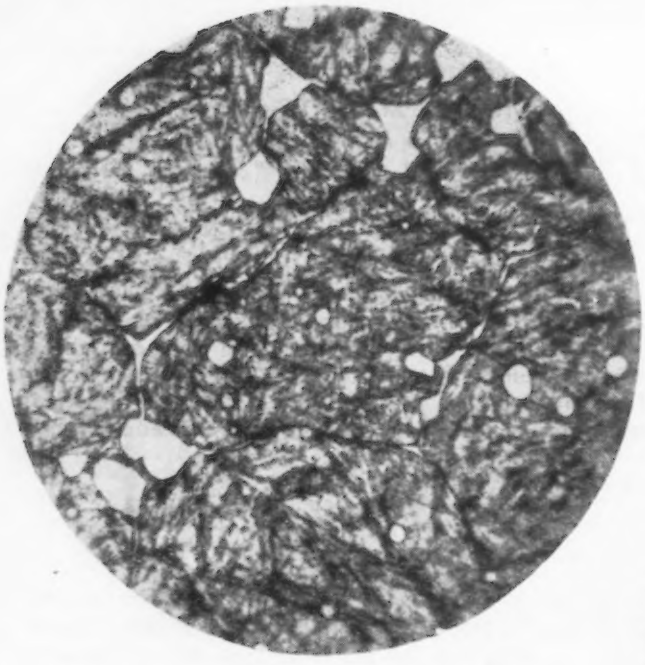

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FIG. 4—Steel No. 1; etch, Aqua Regia; magnification, 1250 diameters; treatment, Type D; austenitized at 2275 deg. F.

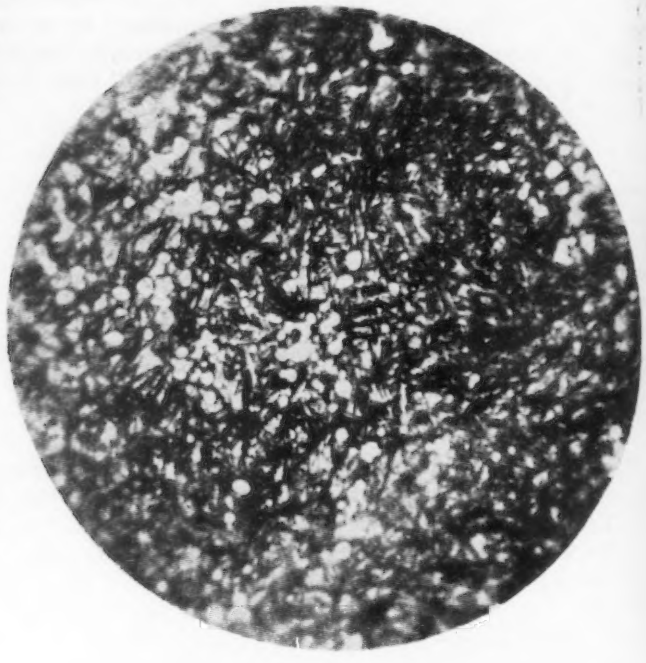

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FIG. 5—Steel No. 1; etch; Aqua Regia; magnification, 1250 diameters; treatment, Type D; austenitized at 2275 deg. F.

6 since they will not operate on this hard material even at 210 ft. per min. Although Steels No. 4 and No. 5 would not operate at 230 to 240 ft. per min., the results on these two steels operating at 200 to 210 ft. per min. revealed that the Type D treatment using 2410 deg. F. as the hardening temperature gave the best results by approximately 50 per cent. It was noted that the sub-zero treatment had little effect on any of the steels when a low hardening temperature was used. This phenomenon may be the results of one of two factors, or the combination of both; the comparatively small amount of carbide solution or the resultant fine grain size. It is believed that both of these factors tend toward lowering the productivity of the tool, regardless of the refrigeration treatment.

Although investigation has not been carried on long enough to have discovered all the metallurgical effects of cold treatment on high speed steel, enough phenomena has been studied under the microscope to venture a few theoretical statements. The investigation by Gordon and Cohen[1] proved definitely that the transformation from austenite to martensite was forced to completion or very near completion by sub-atmospheric temperature. There is no reason to believe that this action will not be the same regardless of the place in the hardening operation that the cold treatment is inserted. Standard hardening practice (Type A) in the author's plant gives approximately 97 per cent transformation if the material is double tempered when it has reached 100 deg. to 150 deg. F. after the quench. If the steel is allowed to cool to and remain at room temperature for 15 min. or more after the quench, the amount of retained austenite after the double temper is approximately 10 per cent. It has also been found that tools with unbalanced sections and sharp corners and fillets will crack before tempering if allowed to remain at room temperature for any appreciable length of time.

Microscopic examination of the structures before and after refrigeration has revealed an additional phenomenon that cannot be explained by the mere fact that the transformation of austenite is complete. Fig. 1

TABLE II

Hardening Temperatures and Physical Properties of Steels Tested

Steel No.	Austenitizing Temperature, Deg. F.	Hardness, Rc		Impact, Ft. lb.		Grain Count	
		Type A	Type D	Type A	Type D	Type A	Type D
1	2175	63.5	65.0	33	29	9½	10
1	2225	63.5	66.5	42	15	10½	6½
1	2275	64.0	67.0	7	6	8	5
2	2175	64.0	65.5	33	34	13	13½
2	2225	63.5	67.0	34	24	12	12½
2	2275	66.0	67.5	10	7	6½	6
3	2175	64.0	66.5	18	12	8½	8
3	2225	64.0	67.0	21	7	8	6½
3	2300	64.5	67.5	4	4	4	4½
4	2275	63.0	65.0	31	32	11	12½
4	2325	63.5	65.5	20	51	10	12
4	2410	63.5	66.5	8	8	5	6
5	2275	62.0	65.0	24	23	12	9
5	2325	64.0	65.0	22	28	10	9½
5	2410	65.0	67.0	4	6	6½	6½
6	2225	62.0	65.0	26	20	12	12½
6	2275	63.5	65.0	13	15	10	11½
6	2350	65.5	66.0	5	6	6½	8½
7	2300	64.0	66.5	12	13	10½	7½
7	2350	64.5	68.0	4	4	6	6
7	2410	65.5	67.0	4	4	5½	5

Note:—Unnotched Izod specimen used for impact test. Intercept method used for grain size.

is a micro-section of Steel No. 3 that was treated by Type A treatment at 2300 deg. F. Examination of this photomicrograph shows definite patches of austenite. The heavy acicular structure of the martensite present is characteristic of all high speed steels hardened and double tempered. Very few carbides are visible. This is due to the high hardening temperature (2300 deg. F.) used, which caused a more complete solution of the carbides than is obtained by ordinary hardening temperatures on this material.

Fig. 2 is a photomicrograph of the same material using Type D treatment with 2300 deg. F. as the hardening temperature. Obviously the transformation of the austenite is very near completion. However, the form of the martensite is much finer, giving a mottled or peppery structure instead of being heavy acicular. It is believed that this phenomenon causes the resultant increase in hardness and productivity. It may also be noted that materials having structures similar to Fig. 2 do not have a tendency to chip and crumble at the cutting edge. This latter phenomenon is particularly characteristic of tools having a structure similar to Fig. 1. Figs. 3 and 4 are the structures that resulted from Type A and Type D treatments respectively on Steel No. 1. The hardening temperature used was 2275 deg. F. More undissolved carbides are present due to the lower austenitizing temperature. The same *fine* martensitic structure is present in Fig. 4 that is revealed in Fig. 2.

Considerable controversy has arisen over the necessity of a cold treatment as low as 100 deg. F. or more below zero. Certain investigators have claimed that this low temperature is not necessary, and that temperatures from 60 deg. to 90 deg. F. below zero will do the job. It has been the author's experience that —100 deg. F. or lower is necessary to make any marked change in *high speed steel.* It seems reasonable to believe that this is due to the high alloy content of the steel, and its resultant tendency to retain austenite. On the carbon and lower alloy steels, treating temperatures from —40 deg. to —80 deg. F. should be sufficient. These latter materials do not readily retain austenite. At least the austenite is very rarely stable, such as is many times true in the alloy steels such as high speed, high carbon-high chrome die steel, and other air hardening steels. Fig. 5 is a microsection of Steel No. 1, treated with Type D treatment, using an austenitizing temperature of 2275 deg. F. and a refrigeration temperature of —85 deg. F. The structure is almost identical to that shown in Fig. 3, which was *not* subjected to any refrigeration. Cutting tests on the material shown in Fig. 5 gave almost identical results as those obtained from the material shown in Fig. 3. Consequently, it seems necessary to hold the treating temperature down to at least —100 deg. F.

As stated before it is believed that an important increase in tool productivity may be obtained regardless of how refrigeration is used so long as it is used, and is followed by a sufficient temper to relieve the tremendous internal strains caused by the process. The scope of the process seems unlimited, and in the not too far distant future the refrigeration unit will be a *must* for all up-to-date hardening rooms.

Articles on Cold Treatment of Metals Which Have Been Published Since Early 1943

"Cold Treatment of Metals"	The Iron Age, Feb. 23, p. 37.
"Additional Notes on the Cold Treatment of Metals"	The Iron Age, June 17, p. 66.
"Cold Treatment of Metals"	Mill & Factory, May, p. 941.
"Effects of Sub-Zero Cooling on Tempering of High Speed Steels"	The Iron Age, March 23, 1944.
"Low Temperature Refrigeration Requirements in War Products"	Refrigeration Engineering, Feb., p. 83.
"Refrigeration Used in Making Airframe Parts"	Refrigeration Engineering, May, p. 342.
"Sub-Zero Temperatures in Industry"	Refrigeration Engineering, Sept., p. 164.
"Utilizing Sub-Zero Temperatures in Design"	Machine Design, Oct., p. 94.
"Refrigeration of Aluminum Alloy Rivets and Parts"	Metals & Alloys, June, p. 1178.
"Sub-Zero Temperatures for Shrink Fits"	Metals & Alloys, July, p. 50.
"'Heat' Treating at 120 Deg. Below Zero"	Steel, Dec. 27, p. 70.
"Sub-Zero Refrigeration"	Tool Engineer, Jan., 1944, p. 99.
"Sub-Zero Hardening Cycles"	Steel, Jan. 10, 1944, p. 86.

TABLE I

Types of Steels Studied in This Investigation

Steel No.	Specification No. *	Trade Name	Type	Heat No.	CHEMICAL COMPOSITION									
					C	Mn	Si	P	S	W	Mo	Cr	Va	Co
1	M-2	Electrite Double-Six	6-5-4-1½	20392	0.85	0.29	0.21	0.028	0.012	5.78	4.57	4.12	1.59	....
2	M-3	Electrite HV-6	6-5-4-3	44113	1.14	0.27	0.28	0.023	0.015	5.59	5.25	4.21	3.04	....
3	M-36	Electrite CO-6	6-5-4-2 Cobalt	44038	0.86	0.31	0.33	0.022	0.014	5.39	4.42	4.07	1.65	8.63
4	T-1	Electrite No. 1	18-4-1	21003	0.73	0.34	0.32	0.029	0.009	17.76	....	4.07	1.07	....
5	T-2	Electrite No. 19	18-4-2	29293	0.85	0.33	0.23	0.023	0.010	18.41	0.68	4.07	2.04	....
6	T-3	Electrite Vanadium	18-4-3	38872	1.00	0.28	0.25	0.027	0.010	17.50	0.89	4.11	2.99	....
7	T-5	Electrite Super Cobalt	18-4-2 Cobalt	44041	0.85	0.29	0.25	0.027	0.012	18.03	0.78	4.30	1.94	8.56

* New specification number adopted by large automotive manufacturers, February, 1944. See THE IRON AGE., Jan. 13, 1944, p. 67.

The Future of

The Machine Tool Industry

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By MAX LEACH
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IT appears now that within the foreseeable future this war will be successfully terminated. Whether it will be one, two or more years no one is in a position to know. Postwar plans, however, should at this time be discussed and made insofar as they do not interfere with the prosecution of the war. There are problems which will arise at the end of the war which the industry will be unprepared to meet unless action is taken now. One such problem is the disposal of surplus machine tools.

It is common knowledge that the government at the present time owns a tremendous amount of machine tools and that many of these tools will be of no use to it at the termination of hostilities. These tools are now in plants operated by private individuals who will at the end of the war reconvert to their particular industries. The easiest way for the government to solve the problem of surplus machinery will, therefore, be to throw them upon the open market in the hope that they will be quickly disposed of. If this procedure is adopted, however, it will unquestionably have a paralyzing effect upon the whole industry for many years to come, yet there can be little doubt that unless plans are now carefully drawn to solve this most important problem, the danger of such a procedure will very probably be realized.

It may be that I have overdrawn the picture. I know there are others in the industry who believe that regardless of the position taken by the government at the end of the war, the industry has a bright future.

For example, there appeared in the Jan. 6 issue of THE IRON AGE an article "Machine Tools" by Milton D. Thalberg who undertook to appraise the present and the future of the machine tool industry. His conclusions were that too many in the industry are overly pessimistic and that what the industry needs is a good shot in the arm. Essentially, Mr. Thalberg believes that there will be a market for machine tools and that there will be plenty of business as long as the industry is wide awake and its sales representatives pitch in and go out and try to sell machine tools and services that the industry is prepared to render. He was of the opinion that we face a bright new world in which the machine tool industry will be revolutionized. Emphasis will be placed upon higher speeds and greater precision. The important factor in all of this, however, in his estimation, was that the industry must be confident of its ability to bring into use machine tools fundamently different from those produced in the past and all of this implemented by an active and intelligent sales approach. I have not fully stated his position, but I believe that substantially the above represents his views.

With much of what has been said, there can, of course, be no substantial disagreement. The members of the machine tool industry as the members of all industry after the war will find that an aggressive and intelligent sales approach will pay dividends. Those manufacturers who have a product that the public demands and who intelligently push sales will do better than those manufacturers who are slow to new demands and backward in their sales methods. This is, of course, all good common sense.

Optimism Not Shared

I, for one, however, do not share Mr. Thalberg's optimism. There is no doubt in my mind that there will be changes made in machine tools produced by the industry. The new machines will have higher speeds and greater precision. These things are all in the cards, but to assume that any changes that the industry may innovate will have the effect of rendering obsolete the tremendous surplus of machine tools in this country at the end of hostilities is in my estimation a grave error.

I believe that Mr. Thalberg misunderstands the purchasing public to whom the industry must sell its products. Take for example a concern which has six radial drills purchased during the war. The likelihood that this company will purchase six replacements if the new ones are streamlined and contain a few more spindle speeds is somewhat remote. Nor do I believe it will purchase six replacements if the new ones have greater precision. As long as the drills are in good condition, the tendency will be to retain them. Now, of course, it is at this very point that Mr. Thalberg suggests that it is the function of the sales representatives of the various companies to sell

the purchaser the idea that there will be a great saving in buying the new machines. The fact remains, however, that for many of the postwar products the speed and precision of the radial drills purchased during war time or even prior will be entirely adequate.

Another example which may be somewhat extreme, but nevertheless illustrates my point, is that of a Rhode Island concern using at the present time a gear cutter 20 years old. This company requires 160 gears per month during the peak of its production. This quantity of gears can be cut in three days. The machine is therefore idle the rest of the month. Regardless of what changes are made in gear cutters, this concern will not be in the maret for one because its needs are amply taken care of by the present tool in use.

. . . While admitting that an aggressive sales policy and redesign of machines will help in stimulating post-war markets, Mr. Leach points out that the future of the industry in the next decade depends largely upon the policy adopted by government in the disposal of surplus machine tools. He proposes that Congress should adopt broad legislation in this regard. In part, this article is a rebuttal to the more optimistic viewpoint expressed by Milton D. Thalberg in the Jan. 6 issue of The Iron Age.

Utility of Standard Tools

The point that I seek to make is that there is nothing in the history of the machine tool industry which would serve as a basis for the proposition that the industry will be so revolutionized that machine tools in operation today and in sound condition will hereafter be discarded. A more intelligent approach to this problem is to recognize that changes will be made, but at the same time to understand that standard machine tools will have great utility and will not be displaced by new models. If this premise is valid, then the problem of the disposal of surplus machine tools is of immediate concern and requires intelligent action now.

According to the National Machine Tool Builder's Association, the output of machine tools in the last three years amounted to approximately $3,209,000,000. Estimating an average price of $4000 per machine, it has been determined that there were produced 800,000 machines in that period. It is estimated that some 12 per cent may have gone to foreign countries leaving an estimated 700,000 machine tools in the United States, of which some 500,000 are very probably owned by the government. It is further estimated that there are approximately 1,700,000 machine tools in use in the country today, of which 700,000 are not over three years old, 350,000 from 4 to 14 years old, while approximately 650,000 machine tools are over 14 years old.

Commenting upon these staggering figures, Frederick S. Blackall, Jr.,[1] very pertinently says:

> "Just consider what 500,000 machine tools mean. It is more than ten times the entire production of a boom year like 1929. It is Two Billion Dollars worth. It is approximately 40 per cent of the total number of machine tools which were in use in this country in 1939. It is 28 per cent of all machines in use in this country today. It is about 20 years' normal production of the industry. Obviously, its disposition will be the most important single factor in the shaping of the industry's future for the years to come."

[1] *"Machine Tool Industry Headed for Chaos or New Era?" Reprinted from Boston News Bureau of Jan. 6, 1944, by the National Machine Tool Builders Association, Cleveland.*

I am not attempting to herald a bleak future. These are facts which no intelligent member of the industry has overlooked. To attempt to disguise the real issue by the presentation of false slogans or by the setting up of straw men only to knock them down is obviously not the answer to the problem.

It has become almost a truism to say that the machine tool industry has been most basic to the successful prosecution of this war. We may be justly proud of this fact. It is equally true that the machine tool industry is most fundamental in times of peace. Much of the post war reconversion and post war progress depend upon a successful and thriving machine tool industry. It is a tremendous factor insofar as employment is concerned and it may be unequivocally stated that a depressed machine tool industry will be a very grave threat to the entire economic life of the country.

After World War I

In 1918 this country produced approximately $220,600,000 worth of machine tools. In 1921 it produced $36,000,000 worth of machine tools. From 1918 through 1925 production of machine tools never reached $100,000,000 in any one year. In the boom year of 1929 it produced only $170,000,000. These figures are from the National Machine Tool Builders' Association.

It will be observed from the figures that at no time during the last war did this country produce such a tremendous dollar volume of machine tools as it has during this war and yet for some time after the termination of World War I there was a serious decline in the industry's output. Unless an intelligent program for the disposal of machine tools is prepared now it is very probable that the post war era will find the machine tool industry in a very depressed state. As already noted, the government will control a tremendous amount of up-to-date equipment. If, when peace comes, these machine tools are thrown upon the open market, the market will undoubtedly become glutted. Based upon the familiar laws of supply and demand, the prices for these machine tools will be depressed and the manufacturer of new machine tools will find a very difficult market for his products.

Position of Industry Reviewed

I have discussed these problems of the future with many representative members of the industry. No one with whom I have talked is overly optimistic. It is not fair to say, however, that there is not real cause for this concern. They have plans and ideas which they would like to set into motion but in many cases they dare not make the first move. Their views may be summarized as follows:

(1) Machine tool manufacturers at present have new designs for machine tools which will be placed on the market as soon as the war is terminated.

(2) Machine tool manufacturers realize that the market will not be as favorable as it has been during the war years. It will require greater sales activity. Manufacturers will again have to go out and stimulate new business.

(3) To a very great extent the normal problems facing the industry will be solved by the individual manufacturer, as these problems have always been solved. Each manufacturer has a different plan and a

different method for implementing these plans.

(4) Reconversion will, in a limited sense, provide activity for the industry.

(5) The postwar world in many respects will be different. Undoubtedly there will be a demand for new equipment.

(6) New markets may very probably be opened up in South America as well as in other parts of the world.

(7) The most important single factor which is holding machine tool manufacturers back is the uncertainty as to what will be done with the surplus machine tools owned by the government.

If there is one thing which we have learned from the depression years, it is that once the cycle starts on a downward trend, it becomes almost impossible to stop it. It is therefore realized that unless the problem of the disposal of surplus machinery can be intelligently controlled, it will raise havoc with the industry for years to come. It is one of those factors which has within it all the explosive qualities of dynamite. If it gets out of hand, all of those calculated and well-laid plans for the future will go for naught. It is for this reason that I believe it is the responsibility of the industry to intelligently decide now upon a course of action and to vigorously pursue it. Any plan which has the support of the industry will of necessity receive Congressional approval. The successful handling of this problem is not alone of importance to the machine tool industry, but, as already indicated, is a matter of immediate and utmost concern to the entire country.

Legislation Proposed

The following are the basic principles which should guide the industry in determining a course of action:

1. *A bill[2] should be drawn to cover specifically the disposal of surplus machinery.*

It has already been suggested by many that the problem of disposal of surplus machinery is no different from the disposal of other surplus properties owned by the government. Individuals who take this position do not clearly apprehend the nature of the problem. Take for example the surplus food that will be owned by the United States government at the termination of hostilities. It is obvious to anyone who will give it consideration that the disposal of surplus foods cannot be prolonged over a period of 20 years. As a matter of fact, it may very well be that these surplus foods will be distributed very shortly after the termination of the war through established trade channels. But even if we were to assume that an error might be made in the disposal of surplus food properties, its devastating effect could only be short-lived. In the case of the machine tool industry, however, a dumping of surplus tools on the market would have a lasting and catastrophic effect.

[2] *There are bills now pending in Congress which contain many of the features of the proposals hereafter set forth. No bill contains all of the proposed suggestions.*

2. *Machine tools owned by the government should be carefully inventoried now with a view to determining their amount, type and quality.*

It is clear that no sensible program for the disposal of surplus machinery can be undertaken without complete knowledge as to what the government has on hand. There can hardly be any dispute as to this proposal.

3. *The government at the end of the war should retain for its own use the best machine tools in order to re-equip arsenals and war plants under its control.*

It seems clear to us now that when peace is declared, this government will have considerable responsibility as a world power. Unless peace can be maintained generally, we will again be faced with the prospect of a new war. Unpreparedness by us is an invitation to aggressor nations to prepare for new breaches of the peace. It is therefore essential that we have a high war potential, so that if at any time necessity requires, we will be in a position to arm ourselves adequately and swiftly.

4. *In the distribution of surplus machinery, priority should be given to vocational schools under the supervision of the Federal and State authorities.*

Here again is a suggestion which I believe can arouse no controversy. Its good sense is apparent.

5. *Once equipment is determined to be obsolete, it should be scrapped.*

This proposal requires no discussion.

6. *A board composed of representative members of the industry, the Army and Navy, and representatives of the public should be appointed by the President to handle the entire problem.*

The disposal of surplus machinery involves very technical questions and also certain matters of important judgment. It cannot be handled intelligently by persons outside the industry. The purpose of a bill dealing with surplus machine tools and the creation of a board composed of members of the machine tool industry having the responsibility of handling the entire problem is to avoid mismanagement, duplication and needless governmental interference. It would be a poor plan indeed which would relegate the members of the machine tool industry to a position on some advisory board having no power to initiate and no power to supervise. It is essential to the solution of the problem facing the industry that its members be well represented on any board assigned to carry out the purposes of the proposed bill.

7. *The board should be carefully instructed by specific statutory language to the effect that it should pursue a policy of rigid scheduling of the release of surplus machinery.*

The program should be envisaged as one continuing over a considerable number of years. Property under the authority of the board should be sold through the *regular trade channels* at those times and in such quantities as will in no way affect the machine tool market. The disposal of surplus machine tools is not to be thought of in terms of a maximum return to the United States Treasury. This is not to say that the disposal of surplus machinery should be a source of great personal profit to certain individuals. On the contrary, any plan which has any chance of being successful must take into consideration the fact that nobody should unduly profit at the expense of the government. This does not mean, however, that the government should consider first how much of a return it can get on its investment. It is a short-sighted policy which will seek to enrich the Treasury at the expense of the industry. From a practical point of view, the return to the United States government will be in any event a negligible factor. Therefore, the criterion of the workability of any plan is whether it protects the industry against the possibility of the sudden and violent disposal of machine tools on the postwar market.

If the government is permitted to enter the market as a competitor of the machine tool manufacturer, then those dangers which have already been portrayed will become an unpleasant reality. On the other hand, if the disposal of machine tools is controlled by a rigid method of sched-

uling of releases over a long period of time, then the industry will be permitted to return to the postwar period in a healthy and stable state.

Resume

At the outset of this article, a dark picture of the state of the machine tool industry was painted. The fear that was expressed was not based upon the conviction that the situation was hopeless. The facts and arguments which have been presented are supported by figures and experience. A knowledge of these facts should induce the industry to quick and courageous action. To attempt to ignore them or to minimize them will unhappily result in irreparable injury to the industry. The problem, however, can be controlled. The cataclysmic effect of the transition period from war to peace can to some extent be mitigated. It can only be mitigated, however, if the problem is squarely met now, and if its solution results in adequate legislation.

The bill which has been proposed does not in minute detail set forth the answers to all the problems which will confront the industry. It is a basis, however, upon which there can be industry agreement.

Welded Hand Truck Simplifies Product Handling

APPLYING arc welding methods to fabricate items that improve efficiency is common practice at the Lincoln Electric Co., Cleveland. One of the scores of interesting examples recently worked out by the company involved the designing and welding of a simple three-wheeled hand truck for handling welding machines in the shipping department.

In order to load the maximum number of welders per railroad car, and yet prevent damage to the equipment in handling and shipping, the machines are simply mounted on wooden skids without crating. Although the principle of this method was sound, it presented a problem of handling the equipment in the confined space of a boxcar and at the same time preventing possible damage, such as striking one machine against another.

To overcome this danger, welders of the plant maintenance department devised and built several all-welded hand trucks as shown in Fig. 1. The easy maneuverability of this truck allows for quick and efficient handling of welding units from shipping room to boxcar.

Design Details

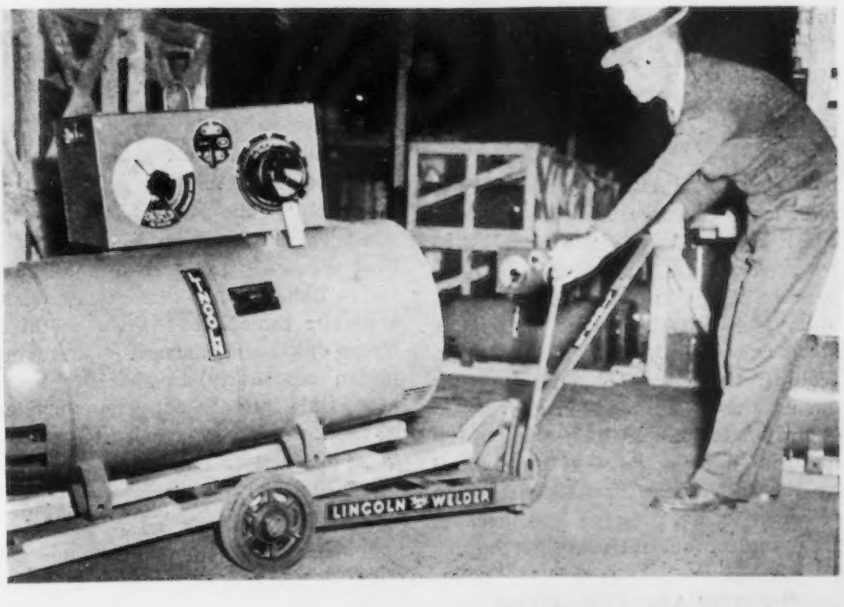
The welder is placed on the truck by tilting its temporary wooden skids up on a 2½-in. diameter roller concentric with the rear axle and sliding the welder forward onto the body of the unit, as shown in Fig. 2. By pressing forward on the lever shown, the operator releases a ratchet locking device on the roller, permitting it to roll freely. Release of the lever control locks the roller and prevents the welder from sliding off the truck while it is being hauled to the boxcar. As a further precaution, there is fitted over the central portion of the roller a strip of spring steel with a section of fabric fastened on its inner side, which acts as a snubber against the roller when depressed by the weight of the braking device. This snubbing or braking device is shown in Fig. 1 at the right (rear) end of the truck.

When the welder has been wheeled into position inside the boxcar, the roller is again released to slide the unit off the truck to its final shipping position.

The saving in time, labor and shipping space afforded through the use of these specially designed hand trucks far outweighs the little time and effort expended in their construction by arc welding methods. The main frame consists of 1½ by 2½-in. angles, ⅝ in. thick, fillet welded at the joints. Cross members are of ¼ by 2½-in. stock, fillet welded to the frame. Braces for the handle are formed and welded to the front brace structure and the front wheel suspension. The trucks, which are equipped with three solid rubber tired wheels, measure only 32 in. in length by 20¼ in. in width.

ABOVE

FIG. 1—General view of arc welded shipping room truck, showing construction details.



RIGHT

FIG. 2—Roller on rear of truck permits skid-supported welder to be easily slid on truck as shown.

Flash-Butt Welding

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. . . Plastic welds made by flash-butt welding form almost a perfect joint and the failure to make the welding complete over the cross section welded indicates poor welding technique. In this article the authors present basic information for producing quality welds, and in succeeding articles factors that involve designing for flash-butt welding and methods for controlling metallurgical changes at the weld line will be presented.

FLASH-BUTT welding is one of the processes included in the general term "resistance welding" and is employed to join metals with a butt joint. Flash-butt welding may be contrasted with the well-known forge weld made by blacksmiths. The blacksmith heats the material to be joined and when the temperature of the heated parts reaches the value which will permit plastic bonding, the parts are forged together by heavy impact pressure. In flash-butt welding, the heating of the material is caused by rapidly recurring short circuits of high electrical currents and the impact forging pressure is produced manually through leverage action, mechanically through a motor driven cam or hydraulically through hydraulic cylinders, as the case may be.

The blacksmith, however, because of the critical factors of hardenability and low melting points of high carbon alloy steels, considers his welding to be confined to medium carbon steels. Flash-butt welding, while complicated by such factors, can overcome them because of the higher degree of flexibility and control. Hence hardenable steels can be flash-butt welded by controlling the electrical energy input during the flashing action and consequently determining the heating of the material during the flashing action; by the use of the flashing action to scavenge scale, slag or gas pockets from the contact surfaces; by the use of a carefully timed high speed, high impact forging pressure and by the use of a post heating current of proper magnitude flowing for the proper length of time in order to retard cooling of the weld, thereby preventing a high hardness and possible cracking. For example, flash-butt welding can be used to join the two lengths of steel shown in Fig. 1, view A.

The welding is performed in a flash-butt welding machine where necessary adjustments are made for welding the type of steel in question, the parts are clamped in the dies, and welding is started by establishing flashing action.

The irregular localized contact between the two lightly touching surfaces results in an extreme localization of heat at the surfaces. The contact area consists of a series of fine short circuiting contacts. The points of the metal contacting are repeatedly raised to the melting point and are blown out in the form of incandescent particles. This effect generates the heat necessary to cause a small zone back of the molten surfaces to attain a plastic condition. As the metal is blown out during flashing, the moving platen constantly advances to bring new points into contact. The expulsion of the incandescent particles (sparks) takes place with such frequency that the visual impression formed is that of a continuous action.

When the plastic zone extends the correct distance back of the molten surfaces, the speed of the platen is suddenly increased, butting the pieces together under the upsetting force and causing a forging action. The result of the forging action in pushing out the molten metal and extruding part of the plastic metal is evident in the finished weld Fig. 1 view B and C.

In many applications, before the welded part can be used it is necessary to remove the extruded material. If this material is removed by one of the numerous machining operations the finished part shows no evidence of the weld, Fig. 1, view D. The surface discoloration has not been touched in order to help identify the position of the weld. If this welded part, Fig. 1, view D, is sectioned through a plane at right angles to the weld and this section properly etched, the weld zone is easily discernible in the photomacrograph, Fig. 2.

A further study of the important actions in a flash-butt weld will furnish an insight as to the basic fundamentals. A knowledge of these fundamentals may easily result in an improvement of weld quality.

Flashing

As previously noted, there are minute points of contact between the two work pieces. Currents of high densities flow through these points of contact, or "bridges," and subject them to very rapid rates of heating. The metal in these bridges is raised to the melting point almost instantaneously. The shape of these bridges when in the liquid state is believed to be determined principally by the surface tension forces and is apparently characterized by a throat approximately at the center, Fig. 3. The liquid metal of these bridges reaches the boiling point very rapidly and the

vapor pressure thus developed, together with the forces due to the magnetic field, serves to rupture the bridges. The incandescent particles of molten metal are thrown out with considerable velocity which is further increased by the continued action of the very strong magnetic field which tends to dispatch them in a direction at right angles to the flow of current. There is a second magnetic field existing inside the secondary loop. This field tends to keep the incandescent particles from entering the loop. Therefore when an observer watches the flashing action, it is noted that while the incandescent particles fan away from the contacting surfaces, the density of the particles in the loop is less than the density outside the loop. This action of the magnetic fields is usually referred to as "magnetic blow-out."

While the bridges are being raised to the incandescent point, they tend to absorb the ambient oxygen. This action plus the residual inert gases left as the result of burning the material in air forms a semi-protective atmosphere, that is, an atmosphere with a reduced oxygen content.

Energy Input

The primary purpose of flashing is to allow enough heat to be generated in order that a plastic zone will be formed to permit adequate upsetting. The electrical energy supplied to the work pieces while flashing is converted to heat and as a definite amount of heat must be added to form the plastic zone, it is possible to add a fixed amount of electrical energy in either a short or long time. This fixed amount of energy added will not be exactly the same when the time of input is short or long because of heat losses through conduction and radiation. The short time of input at a higher rate will have greater total radiation loss while the longer time of input at a lower rate will have a greater total conduction loss. Naturally the velocity of the platen would have to be adjusted to cause changes in the flashing time for these different rates of energy input while flashing off a given amount of material.

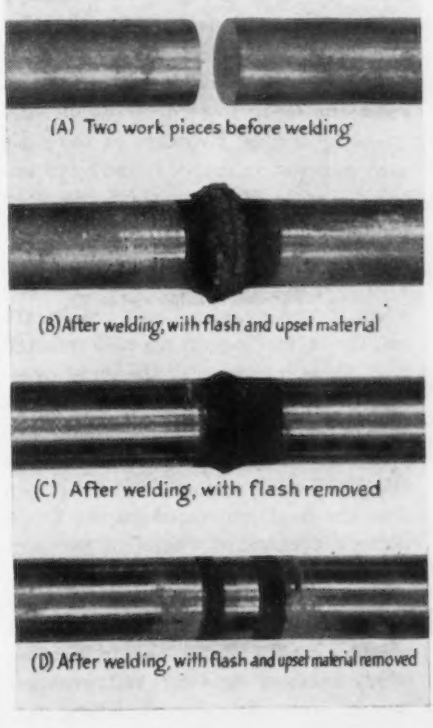
This variation of rate of energy input has two obvious effects. It is noted that the higher the rate of energy input the greater the size, but the less the number of aforementioned liquid bridges blow out (Fig. 4), forming deep craters. It is then apparent that the volume of metal in a molten bridge will be approximately directly proportional to the rate of energy input. The second effect is noticed in the depth of the heat-affected zones. The combination of a low rate of input and a longer input time causes a greater depth of heat affected zone. The heat generated at the contacting surfaces has more time to flow back in the workpieces and effect metallurgical changes. The use of a high rate of energy input with a shorter flashing time makes all factors more sensitive. Such a condition causes an increase in the apparent length of the molten bridges and tends to make more probable the presence of inclusions and porosity. In order to eliminate inclusions or porosity the amount of upset must be increased which in turn increases the material lost in making a weld.

Preheating

Preheating is that action in which the workpieces are brought together under pressure and the heating obtained by the flow of the preheating current through the resistance of the material exposed between the welding electrodes. The contact resistance of the ends of the workpieces is the major part of the total work resistance and therefore the material adjacent to the contacting surfaces becomes much more highly heated than the rest of the material exposed between the dies. The preheating current is turned on and off to allow the heat to even out around the contacting surfaces and to flow back from the contacting surfaces. The value of pressure is such that contact is too complete to allow incandescent particles to be expelled but not of such magnitude that the pieces will either weld together, as happens in a push or upset-butt weld, or deform excessively.

o o o

FIG. 1—An example of flash-butt welding.


(A) Two work pieces before welding
(B) After welding, with flash and upset material
(C) After welding, with flash removed
(D) After welding, with flash and upset material removed

For the majority of applications, it is preferable not to use preheating because it must be principally accomplished by manual control and because it requires a higher power demand to heat a specified volume of metal by preheating than by flashing. In applications where consistent, high quality welds must be obtained, it is desirable to eliminate manual control. The power demand, which is proportional to the preheating current because the line voltage is essentially constant, is much greater than the power demand while flashing. This increase in current through the work is basically due to the work impedance during preheating being less than when flashing.

However, in some applications, the advantages of preheating outweigh the above disadvantages. The two major advantages of preheating are that it permits a proper flashing action to be more easily started on heavy sections normally beyond the electrical capacity of a given welder and will also permit a weld being made with less material lost than when flashing alone is used. The flashing action is more easily started because of the elevated temperature of the contacting surfaces. This is due to the increased resistance of the contacting points plus the shortening of the time required for each point of contact to reach the molten state and rupture. Presuming an equal depth of plastic metal for adequate upsetting is obtained by both the preheating and flashing operation, less material loss results when preheating because the heating action is not entirely due to the progressive flashing away of liquid metal. The only material lost during preheating is the relatively small amount which is lost as the result of a slight upsetting of the semi-plastic metal under pressure. This advantage of losing very little material may become of major importance when welding expensive materials, such as high speed steel in the manufacture of drills, reamers, taps, etc.

Preheating is often used in order to create a more even heat balance if the geometry of the work pieces adjacent to the weld line is materially different. In this case the heat generated in the

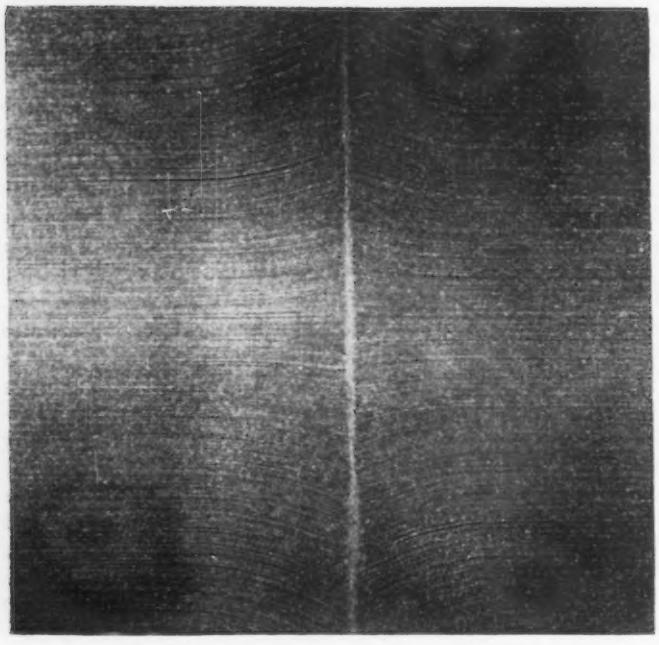


FIG. 2—Photomacrograph of a flash-butt weld in low carbon steel.

larger piece will be more widely distributed and more easily lost, and therefore will require more heat in order to allow a sufficiently plastic zone to form. An example of the above is the welding of a shaft to a solid wheel with a short hub so that the dies holding the wheel would have to grip on the rim rather than on the hub. In the above case only the section of the wheel and hub near the weld line would be preheated.

Occasionally the physical properties of the materials are such that the compressive strength of one material is much less than the other at elevated temperatures. In this case the material with the higher compressive strength is preheated only. For example, if a piece of stainless steel is to be welded to a piece of low carbon steel, the stainless steel may have to be preheated.

Differential Preheating

Occasionally the flashing characteristics of two materials are so different that one material flashes much more readily than the other. In this case one material heats rapidly while the other hardly heats at all. When upset occurs the plastic zone in one workpiece is large while the plastic zone in the other workpiece is very small which causes a poor bonding condition. High silicon steel being welded to low carbon can cause the above condition in which application only the low carbon steel should be preheated.

When welding two air hardening steels, it may be necessary to preheat them in order to prevent cracking. This is a possibility if it is found that external or internal cracking takes place when no preheat is used. Certain hardenable steels require preheating, welding and slow cooling after welding in lime or asbestos feathers while other steels with greater hardenability require preheating, welding and furnace heat treatment immediately following welding. For example, when welding SAE 4150 to SAE 1040 in small sectional areas, the above sequence involving furnace heat treatment will produce the highest weld quality.

Welding Heat

The heat necessary to make a flash-butt weld is acquired by the flashing action or a combination of preheating and flashing. The heat generated must be sufficient to allow a plastic zone of sufficient depth to form to permit adequate upsetting. Evidence of too little heat generation can be found by examining a weld after the flash has been removed. If there are any longitudinal cracks in the extruded material, Fig. 5 *A*, the weld was not hot enough when it was upset. These cracks are similar to forging cracks and resulted from the application of the upset pressure before the metal reached a proper degree of plasticity. From the previous descriptions of the flashing and preheating actions, it may be seen that the heat generated during flashing is concentrated where the surfaces are molten, in back of which the temperature gradient drops off steeply toward the dies. It is this factor that points out the difference in heating effect between flashing and preheating. In preheating the contacting surfaces do not reach the temperatures reached by the contacting surfaces when flashing and the temperature gradient is less steep.

Some further evidence of insufficient heating can be found by examining the slope of the extruded material. If it is sharp, sufficient heat has been generated, if it is flat, sufficient heat has not been generated, Fig 5 *B* and *C*. The varying degrees of plasticity and depth of the plastic zone causes different slopes of the extruded metal.

Upset and Upset Force

The actual fusion takes place during upset. An amount of material must be extruded in order to make possible the expulsion of slag or other inclusions. The extruded molten metal at the weld line should extend beyond the cross-sectional area of the workpiece to insure that all the slag and inclusions will be removed when the flash and upset material is removed. If the flash and upset material is removed by machining, there should be no evidence of the weld. If the weld is sectioned and etched, there should be no evidence of porosity near the outside surfaces. Such evidence indicates incomplete upset due either to insufficient upset force or to insufficient plasticity of the heated metal.

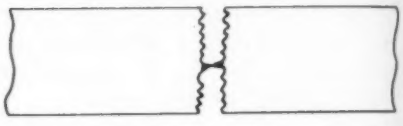


FIG. 3—Current of high densities flow through "bridges".

Upset can be detrimental if of too great a value. In this case most of the plastic metal as well as the molten metal is extruded, allowing bonding to take place in metal where the plasticity may not be sufficient to give a good weld. Such an action is equivalent to introducing less total heat into the weld and will give results similar to those shown in Fig. 5 *C*, except that the amount of extruded material will be larger. Excessive upset force will also bend the flow lines at the weld line so they are 90 deg. to the flow lines in adjacent unwelded material. There is some evidence which indicates

that welds made under these conditions have less fatigue strength at the line of weld than welds made with flow lines having less disturbance.

From a production viewpoint, excess upset material is a waste of money, for not only is more material lost in making the weld but the removal costs of this excessive extruded material may be large enough to make the process uneconomical. The quality of a flash-butt weld is greatly affected by the upset force. During the upsetting action the force should be sufficient to close all voids, expel slag or other impurities and all molten metal. It should also allow the complete fusion of one workpiece with the other.

The ability of the action of the upset force to dispel slag, molten metal and other impurities depends on the actual force, the shape of the section, the time it takes the force to act through the upset distance or the velocity of upset, and the degree of plasticity existing in the material at the time of upset. The velocity of upset is determined by the welder construction, the manner and rate

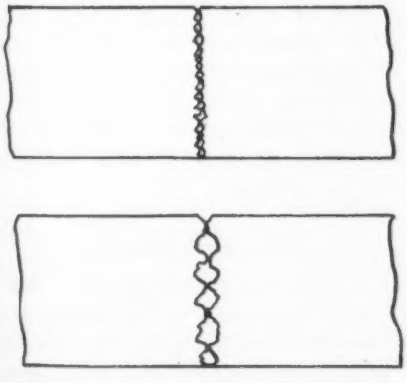


FIG. 4—Two effects of the variation of the rate of energy. (Upper) Low rate of energy input. (Lower) High rate of energy input.

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which the upset force can be applied and the upset force exerted. At the start of upset the metal at the weld is in the molten and plastic states. The closer to the edge the particles to be extruded lie, the more readily they are expelled.

From an examination of the pressure gradient on a solid round section, in the plastic state, it will be seen that the greatest force is exerted on the particles at the center of the section and this force decreases as the particles lie nearer the outside edge. However the particles at the center of the section must travel the greatest distance to be extruded. It is reasonable to expect the center section to be freed first of unwanted particles during upset. At times some of the particles from the center section become trapped on their way out. This would show up as a defect. The fact that inclusions seem to fan out parallel to the contacting surfaces as they approach the outside surface, seems to indicate various zones of constant pressure across the weld section. It is evident that the shorter the paths of the inclusions the easier they may be expelled. This implies that the larger ratio of perimeter to area of section, the more suitable the cross-section is for flash-butt welding as far as ease of extrusion of slag and impurities is concerned.

Welding Suitability Factor

The welding suitability factor does indicate the relative possibilities of obtaining a sound weld but it has another use, namely that of determining the advisability of welding sectional areas larger than those recommended by the manufacturer for the particular type and size of flash-butt welding machine in question.

If J is the welding suitability factor—

For circular sections

$$J = \frac{P}{A} = \frac{\pi d}{\pi \frac{d^2}{4}} = \frac{4}{d}$$

where d is the diameter

For rectangular sections

$$J = \frac{P}{A} = \frac{2(a+b)}{ab}$$

a and b are sides of the rectangle

For tubular sections

$$J = \frac{P}{A} = \frac{\pi(D+d)}{2} = \frac{2}{(D-d)}$$

D = outside diameter and

d = inside diameter of the tubular section

If the suitability factor is large, greater sectional areas can be welded than if this factor is small, therefore it is actually possible to obtain better welds on some types of sections where the area is relatively large than on others where the sectional area is relatively small. Normally it is possible to make an approximation as to whether the welder has sufficient upset force by observing the platen movement during upset. If it is rapid (taking only a few cycles of 60 cycle frequency to complete the travel during upset) enough upset force is available. If it is slow (taking 15 to 30 cycles to complete the travel) or if the platen movement ceases before it travels through the total upset, the upset force is low or the metal doesn't have a sufficient depth of plastic zone.

As is to be expected, the value of the upset force is related to the temperatures of the material in the forged area and the compressive strength of the materials at these elevated temperatures. For the purpose of indicating the welding capacity of flash welders, steels are classified as follows and typical steels of the various classes are given:

Low forging strength steels:

SAE-1020, SAE-1112, SAE-X1112, SAE-X1315. Low alloy steels typified by Cor-Ten, Man-Ten, Sil-Ten, NAX-9115, Yoloy, Ductiloy, Cromansil, Republic RDS, etc.

Medium forging strength steels:

SAE-1045, SAE-1065, SAE-X1335, SAE-3135, SAE-4130, SAE-4140, NE-8442, NE-8640, NE-9440, NE-9540, NE-9640, etc.

High forging strength steels:

SAE-X4340, SAE-4640, stainless iron (12 per cent chrome) stainless steel (18-8 variety), high speed steel, Silchrome, special tool, die and austenitic value stem steels.

Extra high forging strength steels:

All steel exhibiting high strength at elevated temperatures, such as heat-resisting stainless steels.

From the experience gathered over a number of years, the following values of upset force are recommended:

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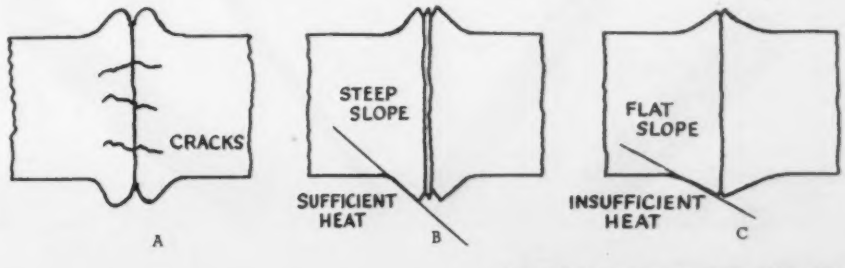
FIG. 5—Sufficient heat must be generated to allow a plastic of the proper depth.



Low forging strength steels:
10,000 lb. per sq.in. of weld sectional area.

Medium forging strength steels:
15,000 lb. per sq.in. of weld sectional area.

High forging strength steels:
25,000 lb. per sq.in. of weld sectional area.

Extra high forging strength steels:
35,000 lb. per sq.in. of weld sectional area.

These figures assume the welding heat to be attained without pre-heating. If the welded parts are properly pre-heated, the above figures may be reduced by 50 per cent.

Upsetting Force and Physical Properties

It should be noted that the upset force in a manually operated machine will show large variations, depending on the skill of the operator. Low upset force is indicated by the evidence of slag and other inclusions plus the presence of porosity. Whenever a weld failure does occur these factors are evident in varying degrees. This applies to any type of test. Static tensile tests are not very sensitive to variations in upset force. The bend test and the continuous dynamic impact test are more sensitive to variations in upsetting force, while fatigue tests show the highest sensitivity of all.

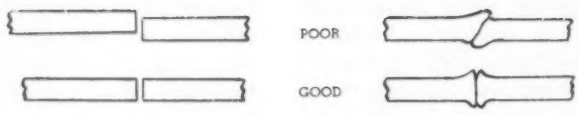


FIG. 6—Workpieces must be properly alined.

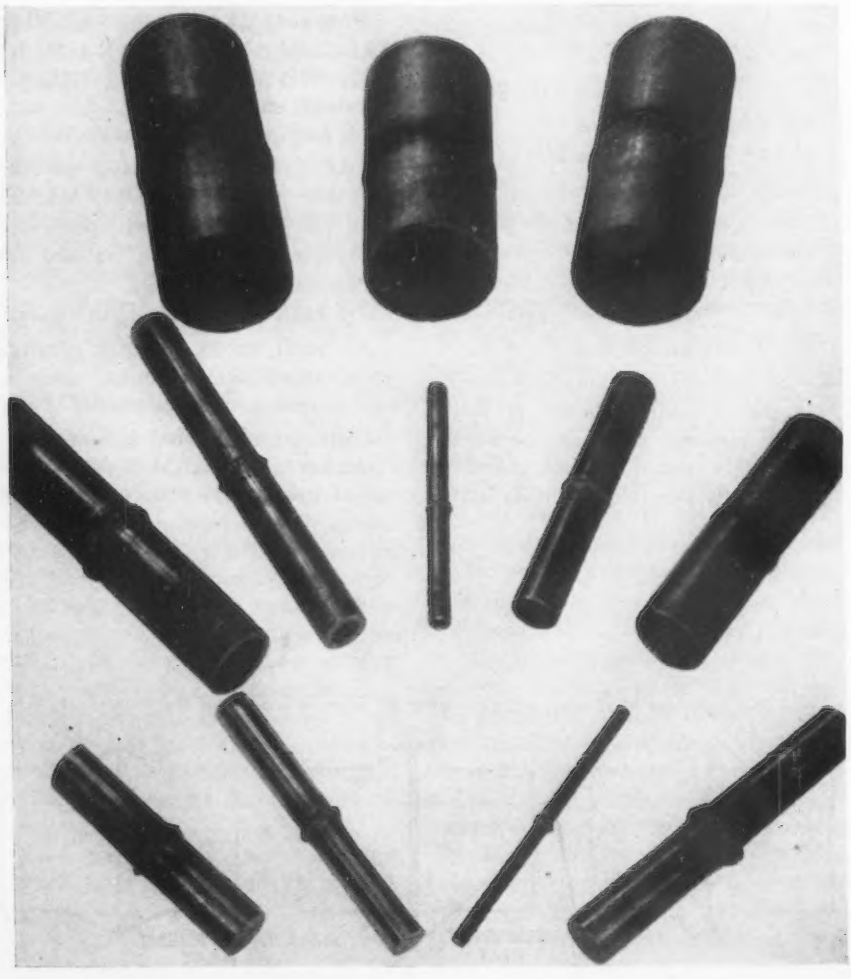
Upsetting Current

The current that flows while upsetting is termed the upsetting current. There is a very short interval of time after flashing has ceased and before the flashing gap has closed when the surfaces of the workpieces which are at high temperatures are exposed to the atmosphere. It is desirable to keep the time of this interval a minimum if the amount of oxidized metal is to be kept to a minimum. From past experience, it has been found that if the current is allowed to flow during the upsetting action the amount of foreign matter is materially reduced in the finished weld.

The upsetting current may continue flowing as long as no overheating takes place. Overheating is evidenced by a burnt weld (in serious cases the weld is actually burnt into two parts). The proper point of stopping the current flow depends on the relative value of the sectional area welded to the maximum sectional area that can be welded. If the sectional area welded is small compared to the maximum sectional area that can be welded using a given welder, the current flow should be short, i.e., current should stop flowing within a cycle or two after upset time starts. If the sectional area to be welded approaches the maximum sectional area that can be welded, the current flow may be relatively long, i.e., 20 to 30 cycles after upsetting starts.

It is apparent that the exact point of current cut-off is not critical providing the current is cut off some time while upsetting and before overheating takes place.

FIG. 7—Resistance flash welds in typical solid and tubular sections of aircraft alloys.



Extensions from Dies

The initial die extension is determined principally by the ability of the metal to attain a plastic condition during the preheating and flashing periods. A portion of the heat generated by the flashing action is lost through conduction to the dies and through radiation. The extension must be large enough to reduce the conduction loss. If the extension is too large, it tends to decrease the slope of the temperature gradient. This decrease is reflected unfavorably when the upsetting is applied, for if the gradient is steep, the effect of upsetting force is greatest and the ability to purge the weld by the extrusion of molten material is highest. The heat-affected zone is partially dependent on the extensions, both initial and final. It may be desired to harden a workpiece before welding and retain a specified degree of hardness after welding in a certain portion of the weld zone. By proper manipulation of the initial and final extensions, the degree of hard-

ness may possibly be satisfactorily retained.

When workpieces are of the same geometric shape and of the same materials the initial extensions are made equal. Unequal extensions may be used to assist in creating a better heat balance when equal extensions will not give satisfactory results. This question of heat balance was noted when discussing preheating; however, unequal extensions during flashing should first be tried before preheating is attempted. The ability of unequal extensions to create an even heat balance is more limited during flashing than during preheating. Length of initial and final extensions for solid and tubular sections are indicated in a succeeding article.

Alinement of Work

The two workpieces to be welded generally possess almost identical sectional areas and shapes adjacent to the weld line. To obtain good welds the workpieces must be alined properly. Misalinement tends to result in a poor flashing condition and in a completely unsatisfactory upset condition, Fig. 6. Typical examples of flash welds in solid and tubular sections are shown in Fig. 7.

Thin wall tubing or any relatively thin sections are the type of sections where maintenance of alinement becomes difficult. It is this factor which determines the recommended values of joint length versus sheet thickness and wall thickness versus tube diameter listed in the article which follows.

(To be continued)

Republic Uses Pentrating Process

A SIX-TANK production line now applies the pentrating process to small aircraft engine parts at Republic Aircraft Products division, the Aviation Corp., Detroit. Pentrating is a salt-mixture controlled oxidization process applied to ferrous metals. The lustrous black finish which results adds to the durability of the metal surface and has marked anti-friction and anti-rust qualities.

Republic is more interested in the anti-friction element, since many of its precision parts for aircraft engines must operate with very close clearance at continuous high speed. Pentrating conditions these parts to prevent seizing. The process is not a deep impregnation but merely coats the aircraft engine part with an oxidized film. No change in the dimensions of a part occur as a result of the pentrating process.

The first step in the Pentrating treatment is the immersion of the aircraft engine parts in a mixture of alkali cleaner and water at a temperature of approximately 180 deg. F. From 15 to 25 min. of exposure to this solution removes all oil and grease from the parts.

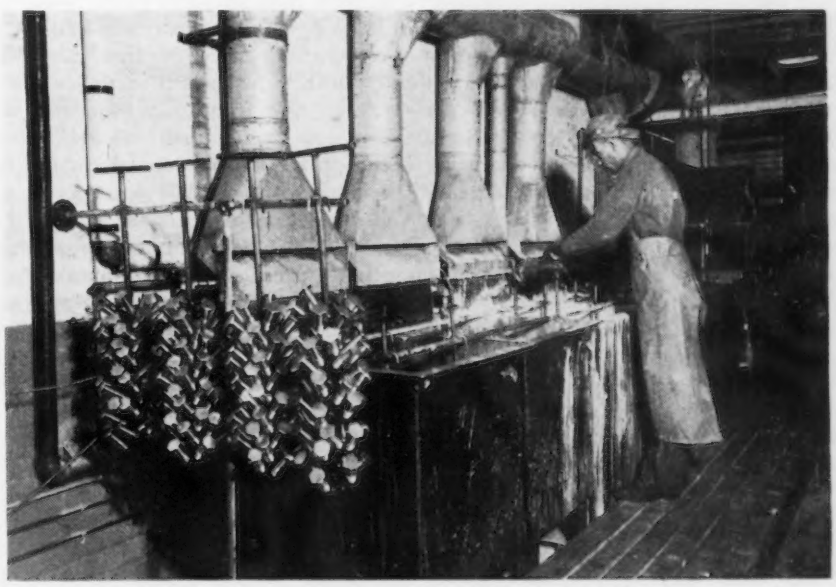
Tank No. 2 contains a hot water rinse into which the racked parts are dipped twice by hand to wash away all traces of the alkali cleaner solution.

The third tank in the line contains the Pentrate solution, heated to a temperature of from 285 deg. to 290 deg. F. The parts are given their first exposure to the salt mixture in this tank for 25 min. They are then transferred to tank No. 4 containing a second batch of pentrate solution at from 302 deg. to 304 deg. F. Here, too, exposure is for 25 min.

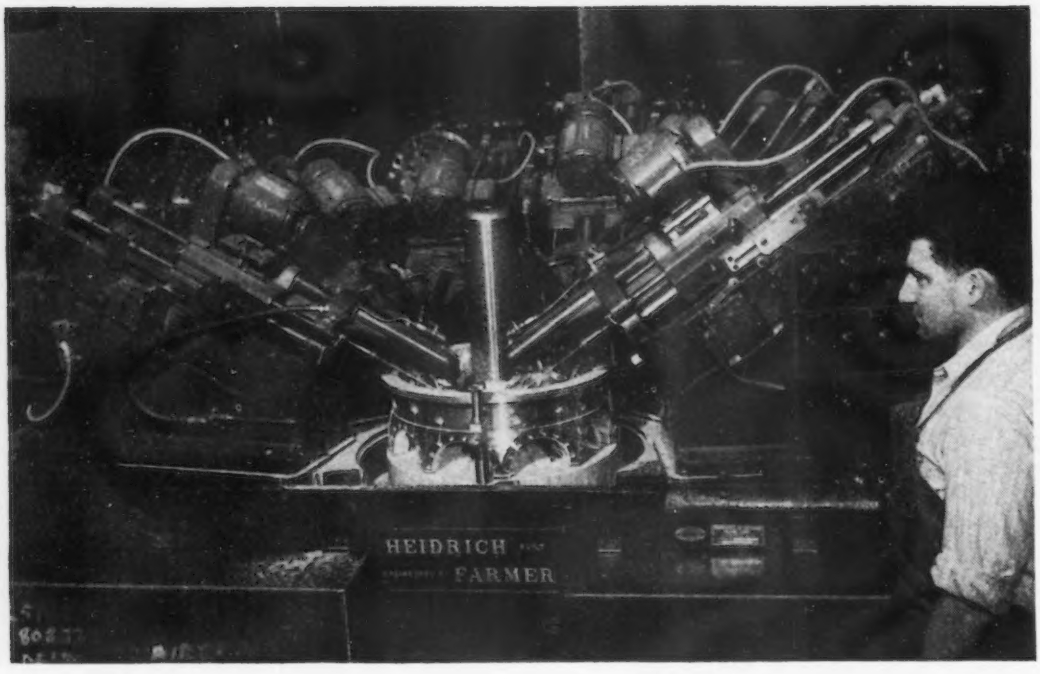
A cold water rinse in tank No. 5, to which the parts are next exposed for another 25 min., is agitated by air to remove all traces of free pentrate deposit.

The sixth tank contains a mixture of soluble oil and hot water at a temperature of 180 deg. F. A final 25-min. exposure to this mixture provides an oil coating for the surface of the pentrated engine part. Removed from this tank at the end of the line, the treated pieces are hung on racks to drain and cool before being placed in stock trays. After a final degreasing they are then treated with a rust-preventive solution and wrapped in waxed paper for shipment.

As hard as the steel surface to which it is applied, this oxide process is notable for the low temperatures at which it is applied. No distortion in the steel from which the aircraft engine part is made can result at these low heats. A control panel maintains the treatment temperatures automatically by adding water to compensate for the increased heat which results from the addition of fresh salt mixture to the tanks. The solution in the tanks is never changed, but is merely added to as loss results from transfer of parts from one tank to the next.



PARTS to be Pentrated are suspended from racks at the head end of the process tanks. Racks are dipped by hand.



Electronic

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APPLICATION of an electronic torque control device has virtually eliminated drill breakage on this special deep hole drilling machine producing 5/32 in. holes 4 in. deep in an aluminum crankcase forging at the Ford Motor Co.

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EXCESSIVE drill breakage on a deep hole drilling operation in aluminum at the Pratt & Whitney engine plant of Ford Motor Co. has led to the development of an electronic control that automatically backs out the drill when torque exceeds a given amount. The device can be set to operate on as low as 1 per cent increase in torque load on the drill spindle, although the usual operating range is closer to 10 per cent in order to offset variations in line voltage due to the intermittent operation of heavy current drawing apparatus on the line.

While drilling machines are available with hydraulic controls that will automatically set the feed in reverse when the end thrust on the drill exceeds a predetermined amount, such equipment was found to be not sensitive enough in the Ford application where 5/32 in. holes, 4 in. deep are being drilled in the forged aluminum so-called power unit or crankcase half of the 2000-hp. P & W radial aircraft engine. Due to the angularity of the holes and the interferences involved, drills about 10 in. long have to be employed. End thrust in drilling aluminum is normally light and even if a build up in end thrust occurred the drill would whip and break before any pressure sensitive device could function. For the same reason, drill breakage was serious even when hand feed sensitive drilling machines were used for this operation. However, breakage of drills does not ordinarily occur from this cause but rather due to an increase in torque as a result of the flutes becoming loaded with chips.

With larger size drills, step drilling at fixed intervals of withdrawal has been successfully applied in the automotive industry in drilling oil holes in both cast iron and steel. But step drilling with a fixed cycle cannot be successfully used in this particular application because it is impossible to predict how frequently the flutes will load up in a drill of this small diameter. Much depends upon the condition of the drill point as is apparent from the action of the machine now installed at the River Rouge plant. Here, in a six-spindle fully automatic unit, no two heads will pull out at the same time. Each head sets its own cycle of pullouts, depending upon the relative sharpness of the respective drill points.

The principle of the torque control unit is the amplification through vacuum tubes of the torque load variations of the electric motor driving the drill. Its application is through electrical relays, limit switches and hydraulic units controlled by solenoid operated valves. Standard pumps and control panels are employed in the hydraulic circuit. In the unit pictured, each head is automatically controlled through a separate torque control unit.

For each drill head, the normal cycle is as follows: The head advances in rapid traverse just short of the drilling position at which point it is slowed down to the feed rate by a limit switch. Drilling continues at the feed rate until an excessive torque force is applied to the drill, due to either undue pressure or the accumulation of chips in the flutes. The torque device then functions, operating a relay which in turn operates a solenoid operated hydraulic valve causing the head to be retracted to its starting position at the rapid traverse rate. At this point a limit switch is tripped and the head is rapid traversed back to a point just short of where it left off drilling and is slowed down to the feed rate. This cycle continues until the hole is completed.

When the head reaches its final position it contacts another limit switch and is returned to its starting position, automatically resetting the feed starting limit switch on its way back. This switch is mounted on a friction slide and during the course of drilling is constantly being pushed forward in step with the advance of the drill. A setscrew adjustment permits the limit switch to be tripped to feed rate about 1/32 in. ahead of the point at which the drill head slide picks up the friction slide on which the limit switch is mounted.

Electronic Control Explained

The Kirkman electronic torque control unit functions on the principle of an unbalanced Wheatstone bridge circuit in which the galvanometer that detects flow of current across the bridge is replaced by the grid circuit of a vacuum tube. By placing several tubes in series, variations in grid potential can be made to actuate a relay and in turn solenoid valves in the hydraulic system. Two sides of the bridge have fixed resistances, the third

Torque Control Prevents Drill Breakage . . .

has an adjustable rheostat which governs the torque range and the fourth leg is connected across the leads of the driving motor. For the 5/32 in. drills mentioned, ¼-hp. motors are used. In effect the device measures variations in voltage across the motor terminals. As the torque is built up the rotor tends to slow down, the current increases, the effective resistance and reactance of the motor drops and the voltage drops. By adjustment of the compensating rheostat, it is possible to actuate the relay with an increase of only 1 in.-oz. torque on the drill spindle. A time delay relay prevents the torque control from being operative until after the feed hydraulic circuit is actuated, thus eliminating the effect of both high starting current and low no-load motor characteristics.

In the machine installed at Ford Motor Co., there are six separate drill heads arranged to drill 18 radial oil holes in the power unit by two indexings after the first set of holes have been drilled. The aluminum forging is clamped on the index table in its lowered position. Pressing the cycle start button elevates the table, starts the drill motors and advances auxiliary slides carrying the drill bushings up to the work. Thereupon the drilling cycle is initiated as indicated above.

When the last head has been retracted, the table is indexed automatically 120 deg. to present the next set of holes. Following automatic drilling, the table is indexed once more to complete the set of oil holes.

Each unit has its own hydraulic pump and control panel and obviously each drill is separately motor driven. One of the pumps also is tied in with the elevating and indexing circuit of the work fixture table. In action each head follows its own course. Sharp drills may cut three-quarters of the depth before the first pullout, while dull drills will begin to pull out almost from the start. In fact, this jabbing action is a warning that the drill needs to be replaced with a sharpened one.

Before this unit was installed, these oil holes were being drilled one at a time in single spindle sensitive drill presses. Even with manual operation, a number of drills were broken daily. This breakage has been greatly reduced on the automatic machines which replace the battery of sensitive drills. Time of drilling has been reduced from 15 min. to 4 min.

The same principle of torque control is being applied by the H. E. Farmer Engineering Co. in the design of a tapping unit which is driven through a reversible motor. When undue stress is applied to the tap, the unit will plug and reverse the motor, backing out the tap to clear the flutes. Tapping and withdrawal continues as called for by motor torque until the required depth is reached. It is believed that this type of torque control may be applied to all machine tool applications as a measure of tool dulling. While the device need not cause retraction of cutting tools where the danger of breakage is negligible, it could be set up to operate a signal light to inform the operator that tools must be replaced.

Decarburizing-Annealing in Carbon Monoxide Carbon Dioxide Mixtures

A REPORT on a laboratory investigation of the decarburizing of white cast iron in CO-CO_2 mixtures at temperatures between 950 deg. and 1050 deg. C. has been presented by W. Baukloh and others in Archiv für das Eisenhüttenwesen. The effect of wall thickness, annealing time and temperature, and gas composition, as well as that of the carbon content of the iron and the elements manganese, nickel, chromium, vanadium and sulphur, were studied. The conclusions were: (1) The rate of decarburization increases with the temperature; in the first two hours the rate is many times that at the end of ten hours. (2) The gasification of the carbon takes place almost entirely at the surface of the metal; to keep the reaction going, the carbon migrates from the interior to the surface, and the rate of diffusion determines the rate of decarburization; this confirms Ledebur's theory for this reaction. (3) The rule that, with steel, the amount of carbon converted to gas in unit of time is proportional to the initial carbon content, cannot be applied to the hypoeutectoid white irons. For short annealing times the precipitation of primary cementite, which increases with increasing carbon content, appears to lower the diffusion and decarburization rates, while for long annealing times this phenomenon is scarcely noticeable. (4) Small additions of manganese, nickel, chromium and vanadium have but little effect on the rate of decarburization; with higher percentages the effect is usually unfavorable, but molybdenum does increase the rate at 1050 deg. C. Sulphur appears to hinder the diffusion of carbon to the surface. (5) At low gas velocities the maximum rate of decarburization occurs with a mixture of 28 per cent of CO_2 with 72 per cent of CO. (6) With CO_2 above about 28 per cent, scaling occurs at 1050 deg. C. and the decarburization rate is lowered. (7) White iron can be decarburized without scaling by a CO_2-CO mixture of a composition in equilibrium with wüstite, provided that the carbon content is not below a critical amount; at carbon contents below this the CO_2 content of the mixture must be decreased to avoid scaling.

Gooseneck Carbide

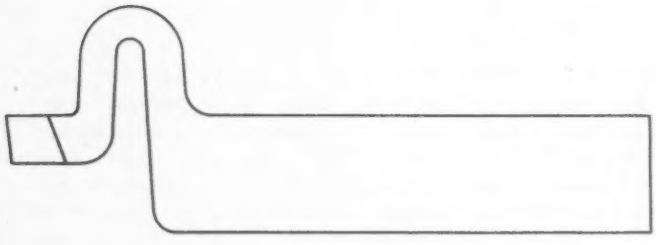


FIG. 1—Loop type gooseneck tool.

FIG. 2 — Straight type gooseneck tool.

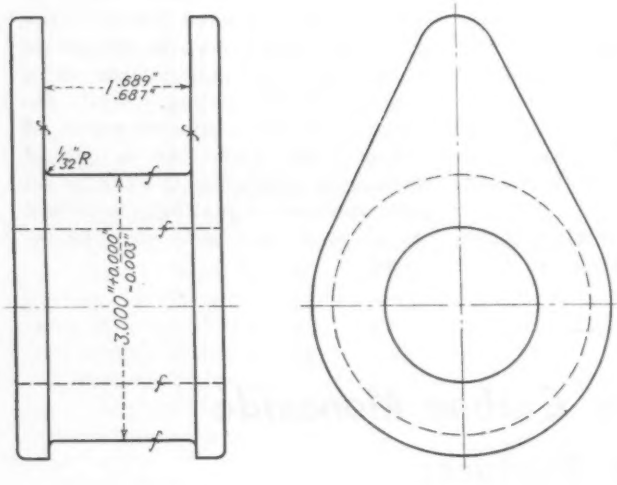


FIG. 3—Facing the inside surfaces of the lugs of this fulcrum bracket entails an intermittent cut that is hard on carbide tools.

ASK any old time mechanic to show you a gooseneck threading or radius tool and he will show you a tool, the side view of which looks like Fig. 1 or a more modern version of the gooseneck tool shown in Fig. 2.

Gooseneck tools are universally known for the excellent finish they produce in threading, cutting radii, and taking flash-cut finishes on steel. The light spring action of the tool keeps the cutting edge from "digging in" when the hazardous last finishing cut is being made at close tolerances. What would happen if a tool of this kind were tipped with carbide? Would there be any advantage?

In order to understand the action of a gooseneck tool holder a comparison can be made with the recoil action of a large gun at the moment of firing. If it was not for this recoil to absorb the sudden shock at the time of the

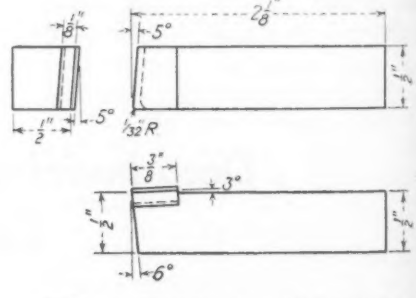


FIG. 6—Right hand carbide tipped facing tool used in the holder shown in Fig. 5.

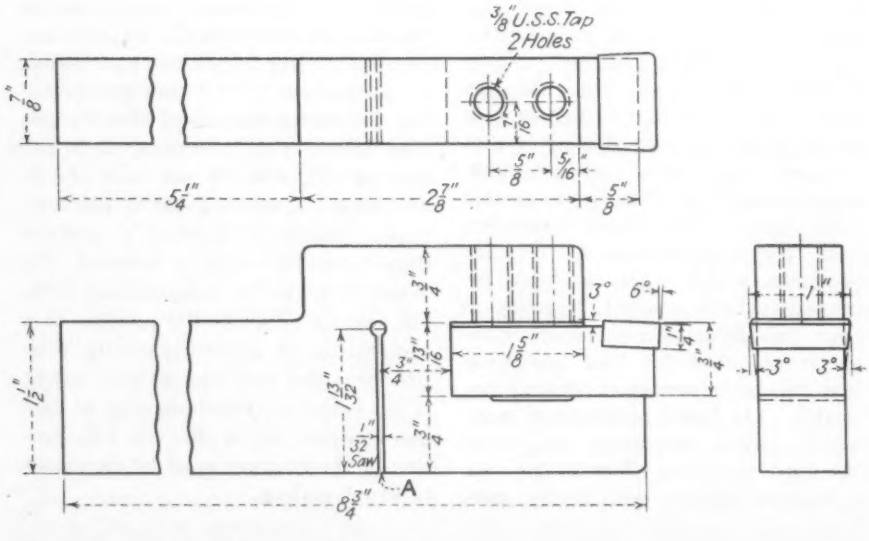


FIG. 4—Gooseneck tool holder for use with a flat nosed turning tool for grooving the fulcrum bracket shown in Fig. 3.

Tools . . .

By GAYLORD G. THOMPSON
Manufacturing Engineer, Joshua Hendy Iron Works, Sunnyvale, Cal.

. . . Running counter to the accepted practice that carbide tools must be clamped solid for efficient cutting of metal, the author advocates the use of carbide tools with gooseneck shanks to absorb the shock present on interrupted cuts. He illustrates two forms of gooseneck tool holders that proved successful on a specific job.

discharge, either the barrel would explode or the entire gun unit would be torn from its foundation. For discussion purposes let us assume (as is often done with moving pictures) that this entire action of the gun firing is reversed; the shell returns to the gun at the same speed at which it left the barrel; the explosive gases in the barrel are compressed and the gun recoils and comes back into the starting position. Hold this thought in mind as we proceed with the following paragraphs.

Carbide tool manufacturers have unanimously recommended solid and rugged clamping support for carbide tools. Chattering ruins the cutting edge of carbide tools because of their very low tensile strength. Often the very nature or design of the work or loose spindle bearings causes chattering and vibration regardless of how solid the tool is clamped in position. When this is experienced, a sort of helplessness comes over the mechanic and after fracturing a number of carbide tips he becomes discouraged and reverts back to slower speeds with high-speed steel cutting tools.

Intermittent Cuts

Then there is the problem of intermittent cuts. Carbide tool manufacturers have featured in their catalogs the shear type of turning and facing tools with negative back rake angles ranging from 20 to 35 deg. Some excellent performance records have been credited to this type of tool and as a consequence it has definitely taken its place among metal cutting tools.

However, there are some limitatins to this type of tool such as, for example, the inside facing and turning operation on the forged steel fulcrum bracket shown in Fig. 3. Here we have intermittent cutting on the inside facing operation of the lugs which blends into the turning operation at the bottom of the groove. This is where we take a lesson from the recoil mechanism of the gun operating in reverse. If the recoil mechanism is necessary to keep the gun from "blowing up," why not some sort of recoil for carbide tools when performing intermittent cutting operations?

Mr. Thompson has contributed a number of articles on carbide tool practice which appeared in the following issues of THE IRON AGE: *May 9, 1940, "Control and use of Carbide Tools in the Shop"; July 4, 1940, "Chip Curlers for Carbide Tools"; Sept. 12, 1940, "Tool Crib Control of Carbide Tools"; Oct. 24, 1940, "Specifications for Carbide Tools"; Nov. 21 1940, "Making Carbide Tools"; Sept. 11, 1941, "Steel Cutting Carbide Tools"; May 14, 1942, "Carbide Tools for Shell Work"; March 25, 1943, "New Slants on Carbide Tools".*

A southwest manufacturer "cracked up" so many carbide tools in his effort to perform the machining operation on the part shown in Fig. 3, that he gave up the job and started to use high-speed steel. He used a solid and very rugged support for the carbide facing and grooving tools. You can just imagine the consequences when those lugs came around almost three hundred times a minute and struck the carbide tip, making a noise like that of a machine gun. The carbide tool was set so solid it had no chance to recoil from the shock of the blows and the tool was ruined.

Now, let's give the tool holder shown in Fig. 4 the "once over." Note that this holder incorporates the fundamental features of the gooseneck tool as shown at *A*. Two of these holders were used on the fulcrum bracket shown in Fig. 3, one for roughing and one for finishing the 3 in. journal diameter or groove. No facing operation was performed with these two tools. It will be noted that the groove is too wide for one tool, consequently a narrower tool was used which permitted faster cutting speeds. In starting the operation, the rougher was brought up close to the right inside face and a groove cut to within 1/32 in. of the finished size. Then the rougher was brought over near to the left face and the stock removed to the depth of the first cut.

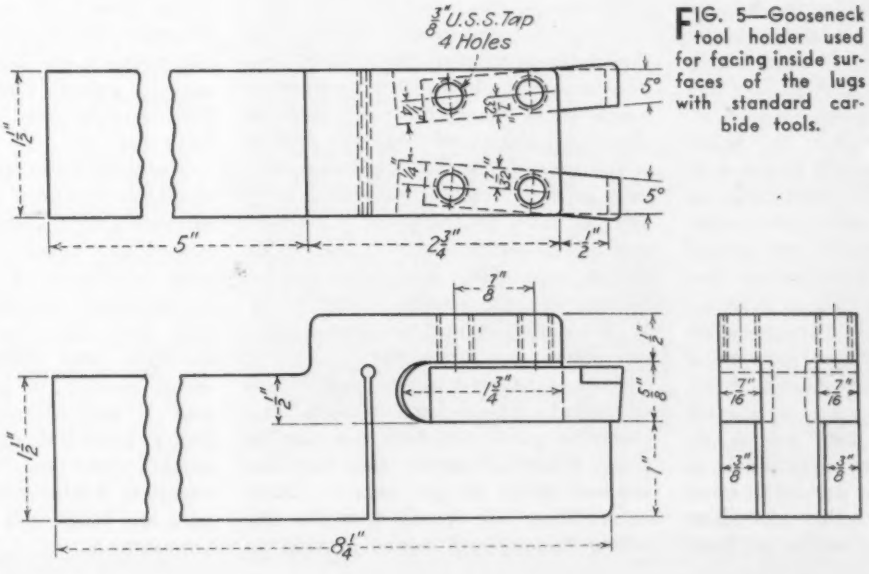


FIG. 5—Gooseneck tool holder used for facing inside surfaces of the lugs with standard carbide tools.

The problem of facing the two inside surfaces of the lugs with carbide tools was accomplished with the tool holder shown in Fig. 5 using a pair of roughing and finishing tools. Note that this holder also incorporates

the fundamental features of the gooseneck tool. Another characteristic of this holder that is very important in its operation is the angle at which the two tool bits are clamped in the holder. Anyone who has tried to make carbide grooving tools retain sizes in the solid form can appreciate the difficulty this entails. A solid carbide tip the full width of the distance between the finished inside faces of the lugs would not hold the tolerance limits for any economical length of time. Then, too, the cost of one solid tip could not be justified since much of it would contribute nothing to the machining operation.

By having the two separate facing tools set at an angle in the holder, minute adjustments can be made in the width dimensions simply by moving the tools forward for greater width or backward for less width. This fine adjustment compensates for tool wear. Then too, standard carbide tools can be used and this is a very decided economical advantage. Details of the right hand facing tools are shown in Fig. 6.

Some manufacturers of carbide tools assert that they provide a sort of a laminated cushion underneath the carbide tip when it is brazed to the shank. It just does not seem logical to cushion a brazed tip because a very slight movement of the tip will either fracture it or knock it loose entirely from the shank. However, the gooseneck style of design as described has the feature of absorbing considerable of the shock of intermittent cutting and provides that cushioning effect so desirable when the merciless attack of the work tends to destroy the carbide tip.

There was a time when manufacturers said: "Don't use carbide tools for boring small diameters in steel; don't use carbide tools for cutting threads, the cutting speeds would be too slow; don't use carbides for forming dies, don't use carbide tools in setups that will not hold the tools perfectly solid, etc. Nevertheless, these operations are now being performed throughout the country in many manufacturing plants. The very unpredictability of carbide tools and what they will do has kept many a tool engineer and mechanic wondering what the heck is going to happen next.

Reducing Columbium Oxide

A NEW process for reducing columbium oxide to pure columbium, discovered by Claire C. and Clarence W. Balke of the Fansteel Metallurgical Corp., North Chicago, was described at the April meeting of the Electrochemical Society. Columbium oxide of the desired purity is prepared from columbium residues and a part of this oxide is carburized by heating an intimate mixture with lampblack in an inert atmosphere. The carbide is analyzed for carbon and mixed with oxide in a ratio to give a mixture containing equal atomic proportions of oxygen and carbon.

When this mixture of columbium carbide and oxide is heated in a vacuum, carbon monxide is liberated and columbium metal remains. The yield is only slightly less than that calculated from the equation $Cb_2O_5 + 5CbC = 7\ Cb + 5CO$.

The metal is next converted to powder in a ballmill. Electrolytic columbium powder consists of small individual crystals. The particle size and the grain size are quite closely coextensive. The powder is fairly coarse in relation to such powders as hydrogen - reduced molybdenum or tungsten. In the case of Cb powder made as described above, the actual grain size may be of molecular proportions and each particle is made up of many grains. This distinction between particle and grain size in metal powders must always be kept in mind.

The columbium powder is pressed into bar form at 50 tons per sq. in. Bars intended for the production of rod or wire are made square in cross section; those to be rolled into sheet are pressed with a width at least twice their thickness. These bars can be handled without danger of breakage and have sufficient resistance to compression to be firmly held when their ends are gripped by water-cooled terminals in the sintering furnace. The bars are heated in a vacuum by their resistance to the passage of an electric current. The furnace must be equipped with very high capacity vacuum pumps. These must be selected and arranged so that their capacity remains high when the gas pressure becomes low. In addition to sintering the metal, this operation reduces the gas content to the lowest possible value. Oxygen especially must be removed just as completely as possible since very small amounts make the metal harder and less easily annealed.

Effect of Sintering

Due to the difference in the actual grain size of the two types of columbium powder, the sintering technique, especially as regards the rate of temperature change and the maximum temperature used, is not identical. The smaller the grain size, the greater is the tendency to develop large crystals in the sintered metal. Due in part at least to the greater particle size of the powder, these bars do not shrink appreciably even when heated to the highest usable temperature. With columbium and tantalum this is an advantage since the escape of oxygen is favored by the porosity of the metal. To compact the metal and close the pores, the bars are worked under a heavy hammer until they are reduced about 20 per cent in thickness. They are returned to the sintering furnace and heated to weld up the new contacts formed by the mechanical working. After passing through this cycle once more, the metal is solid and free from pores.

After the completion of these heating operations, the bars can be hammered, swaged or rolled. Sheet can be spun or drawn into seamless tubing. All of these operations are carried out at room temperature. The metal is never heated in the air even while being welded by resistance or arc welding. If any of these operations are carried far enough to appreciably strain-harden the metal, it is annealed by heating in a vacuum furnace.

Columbium is a platinum-white, soft, ductile metal. Its density, 8.4, is about one-half that of tantalum. Its linear coefficient of expansion is 7.2×10^{-6} and the electrical resistance 17.0 microhm per c.c. at 68 deg. F. The work function of columbium is the lowest of any of the pure refractory metals, being 3.96 volts. The literature gives 3542 deg. F. as the melting point. This figure is too low. The correct one is probably above 3812 deg. F.

Heretofore the supply of columbium available has been too limited to warrant an active search for possible applications. Several investigations are now under way. It has been found to be as suitable as gold alloys for fountain pen nibs because it has the strength and springiness required, welds readily to iridium alloy tips, and is not corroded by acid inks. Other potential applications are in certain electronic tubes and in some chemical equipment where its lightness and toughness are particular advantages.

Reclaiming 75 mm. A.P. Shot By Forging

. . . Herein is described one method used by the forging industry to make 75 mm. M72 solid shot into the more deadly 75 mm. M61 carrying an explosive charge. Re-forging made it possible to convert this shot without waste of material and eliminated many machining operations.

By CHARLES C. BARRENBRUGGE
Designing Engineer,
Portland Forge & Foundry Co.,
Portland, Ind.

ARMY men know the value of superior fire power in blasting the enemy and how it saves the lives of many of our soldiers. Tanks are destroyed with armor piercing shot. In the 75 mm. size, of the two types shown in Fig. 1, the M61 was found to be the more effective during the earlier battles of the war because it had both piercing and explosive power. Prompted by this experience, the U. S. Ordnance Department recalled millions of M72 solid 75 mm. shot from the field and gave American industry the task of reclaiming these so they could be made into the more potent M61 projectiles.

The forging industry was selected to play an important part in the remaking of this shot. The larger manufacturer of shells could probably have accepted the whole contract, but small industry too has a responsibility in this war and many of these smaller manufacturers were ready to meet the challenge. The Portland Forge & Foundry Co. was one of those who began immediately to conduct experiments to develop a forging method of making the explosive type shot out of the obsolete solid shot.

This small forge shop, known in the midwest as "The Village Blacksmith Shop," has gained national recognition for its development of processes on the forging of high explosive shells. (See THE IRON AGE, Oct. 16, 1941, and Nov. 12, 1942.) Although it is listed among the smaller industries, before the war this shop normally forged about 10 per cent of all the alloy steel manufactured for forging purposes. Above the plant for some time has flown the Army-Navy "E" for outstanding production of war materials.

When new processes or methods are developed today, it is essential to make the best use of manpower, machines and materials. With this thought in mind, the engineers of numerous plants set out to develop forging methods that would speed the processing of this new shot. A score or more of manufacturers, large and small, have put their facilities to work on this job. All types of forging machines and processes are being used. Steam hammers, presses, upsetters,

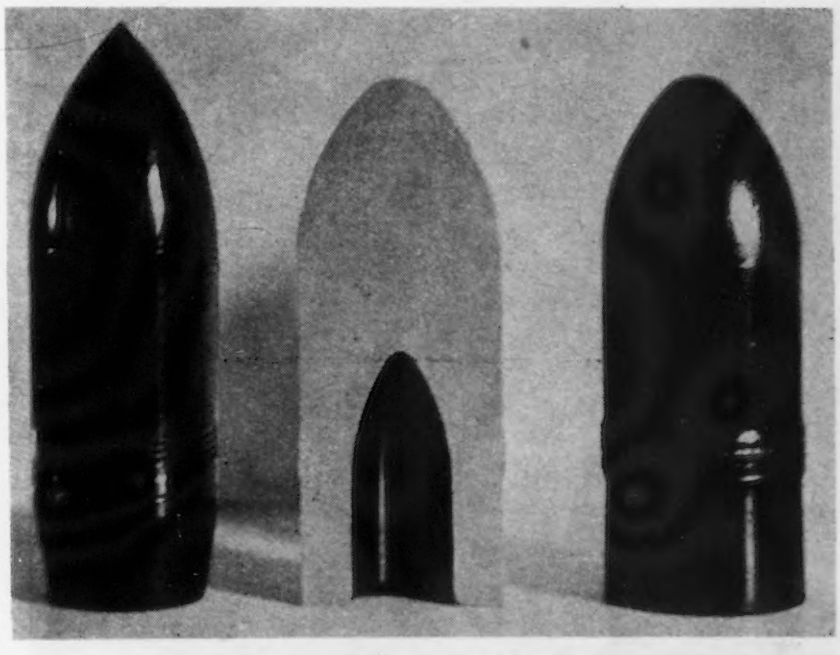
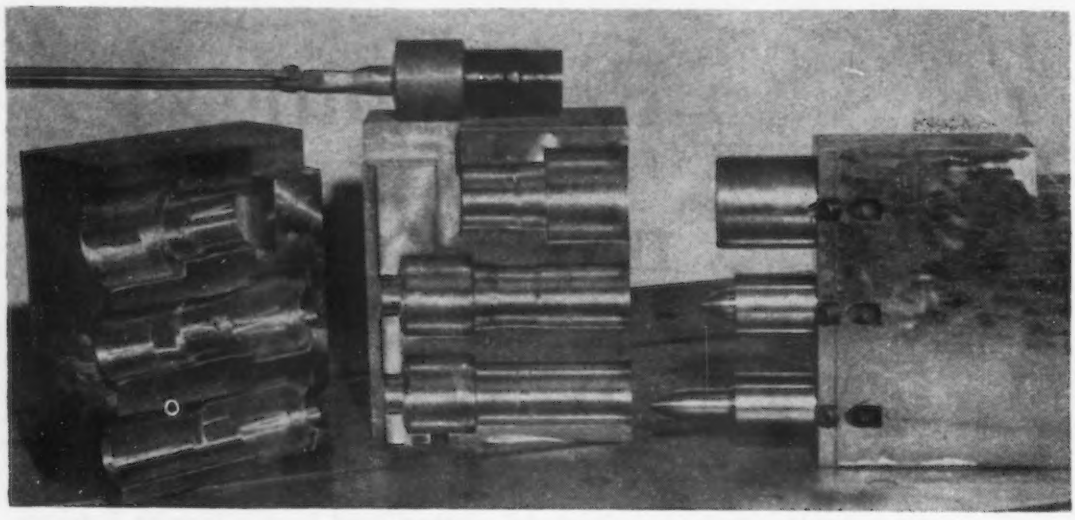


FIG. 1—(Left) 75 mm., M72 solid A. P. shot with rotating band removed and ready to forge. (Center and right) Inside and outside view of 75 mm., M61 forging made from the M72 shown at the right. Note the expansion of knurled band groove on forging.

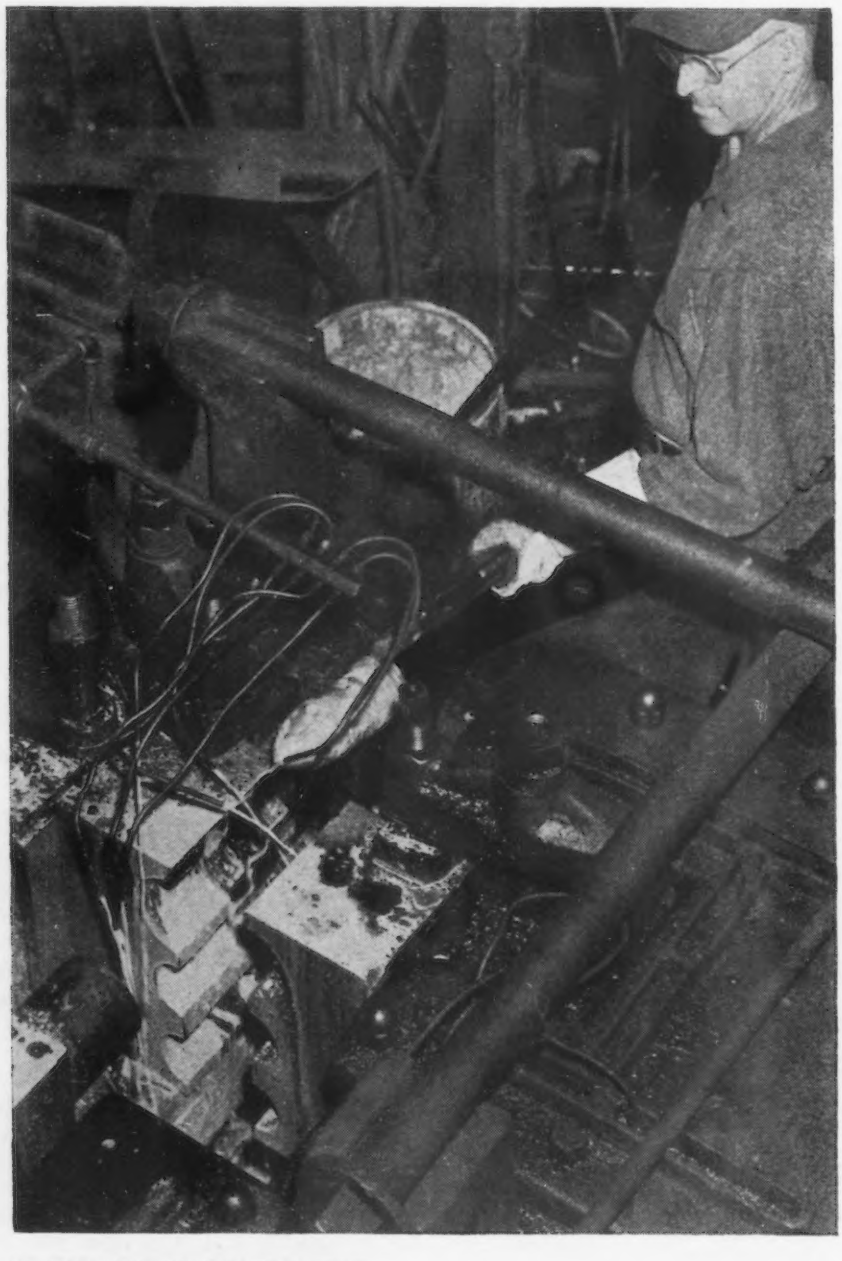


LEFT

FIG. 2 — Die and tool setup for forging M61 shot. The first operation forms the nose of the shot. The special tongs shown are used to hold the forging for the piercing operations and are so machined that they will uniformly grip the nose of the shot.

BELOW

FIG. 3—Continuous streams of lubricating solution are pumped over the dies and punches to keep them cool. This steady flow also washes away all particles of scale and thereby results in longer die and punch life.



etc., are turning out these shot by many unique methods.

The process put into practice at Portland Forge may not be the best in the country but its simplicity and accuracy make it adaptable to most any kind of upset forging machine, old or new. The method has been in mass production for more than six months and one single unit has been the source of supply for two machining companies. As the result of the forging process, good grain structure of the steel is evident in the fact that the firing tests are among the best. Scrap is almost nil and the steady tempo of production has proven its reliability as a sound forging practice.

This 75 mm. M61 A. P. shot forging is made from a finished 75 mm. M72 projectile in three passes on an old 3 in. Ajax upset forging machine. The cavity of the shot is approximately 1½ in. in diameter and 4 in. deep, as shown in Fig. 1. Before heating the shot to forge, the rotating band is removed by revolving the shot in a Morley knurling machine. The knurling tool is held against the band by means of an air cylinder with a 90 lb. pressure. The rolling action on the outside of the band causes it to stretch, thereby increasing the diameter so that when the shot is removed from the machine the band falls off.

Upset Forging Operation

The forging is completed in three passes in the dies shown in Fig. 2. The first punch and die restrike and upset the nose to the desired blunter contour. The nose of the forging is then gripped in a special pair of tongs which fits an enlarged recess in the die. The first piercing operation is performed to assure proper centering which is necessary in the following operation if sound concentric

forgings are to be obtained. The third and final operation pierces the cavity to depth. Note in Fig. 2 the enlarged diameter in the die cavity of the finished pass where the knurled groove which holds the rotating band can expand to a larger diameter. This groove in the cavity of the die serves two purposes. First, to make sure any cold shut formed by the sharp edges of the band groove will be turned off during the machining process, and secondly to retain the forging in the die while the punch is being withdrawn from the cavity.

The forging is produced without any waste of material. The metal displaced by the cavity in the shot makes possible the necessary stock for re-machining on the outside diameter. No press trimming operations are required. The amazing part of this whole process is the fact that the hole inside the shot is held within 0.020 in. tolerance on diameter. Also, the eccentricity is less than 0.050 in. runout, total indicator reading.

After the forgings are completed in three passes, they are thrown down a delivery chute into a tote box. From here they are moved by a material handler to the shipping department where they are checked to determine the amount of eccentricity, dimension tolerance, etc.

First Annealed

Two oil fired furnaces are used to heat the shot to forging temperature. Because the shot have been previously heat treated, they are first put into a pusher type preheat furnace which is designed to raise the temperature slowly to 1200 deg. F. This process of heating prevents the possibility of cracking and insures an even heat throughout the shot. They drop from this furnace down a chute to the heater man (Fig. 4) who places them in a slot type furnace. Here, the temperature is raised to 2100 deg. F., ready to forge. The heating cycle is so arranged that enough shot are carried in the furnaces to keep the forging machine running at top speed.

Die life is increased and the tools are prevented from scoring by the application of a special cooling and lubricating solution compounded in the Portland Forge laboratory. The solution is placed in a pit by the side of the machine and pumped over the dies and tools as shown in Fig. 3. This solution not only lubricates the tools but washes the scale from the dies and punches down in to the pit where it is deposited. The coolant flows over a retaining wall and is then pumped back over the dies and punches again.

So effective is this solution that high priced tool steels are not required for the dies and punches. Hardtem A (Heppenstall) or FX No. 1 (A. Finkl & Sons Co., Chicago) is used to make all dies and tools. This steel is treated before machining, therefore no heat treating or grinding operations are necessary. This is only one of numerous examples where proper die design and lubrication can solve many problems pertaining to tool life which are so often turned over to the metallurgical department in an effort to obtain better results.

Army Ordnance engineers are to be congratulated for their decision to make the solid into the explosive type shot, so that American boys will have the benefit of superior fire power. Certainly, such good judgment will win the gratitude of the nation. Industry too is proud of the fact that it can produce when called upon to supply the fighting men at the front with the best weapons in the world. Once again, small industry has proven that it can accept responsibility and contribute to our war effort.

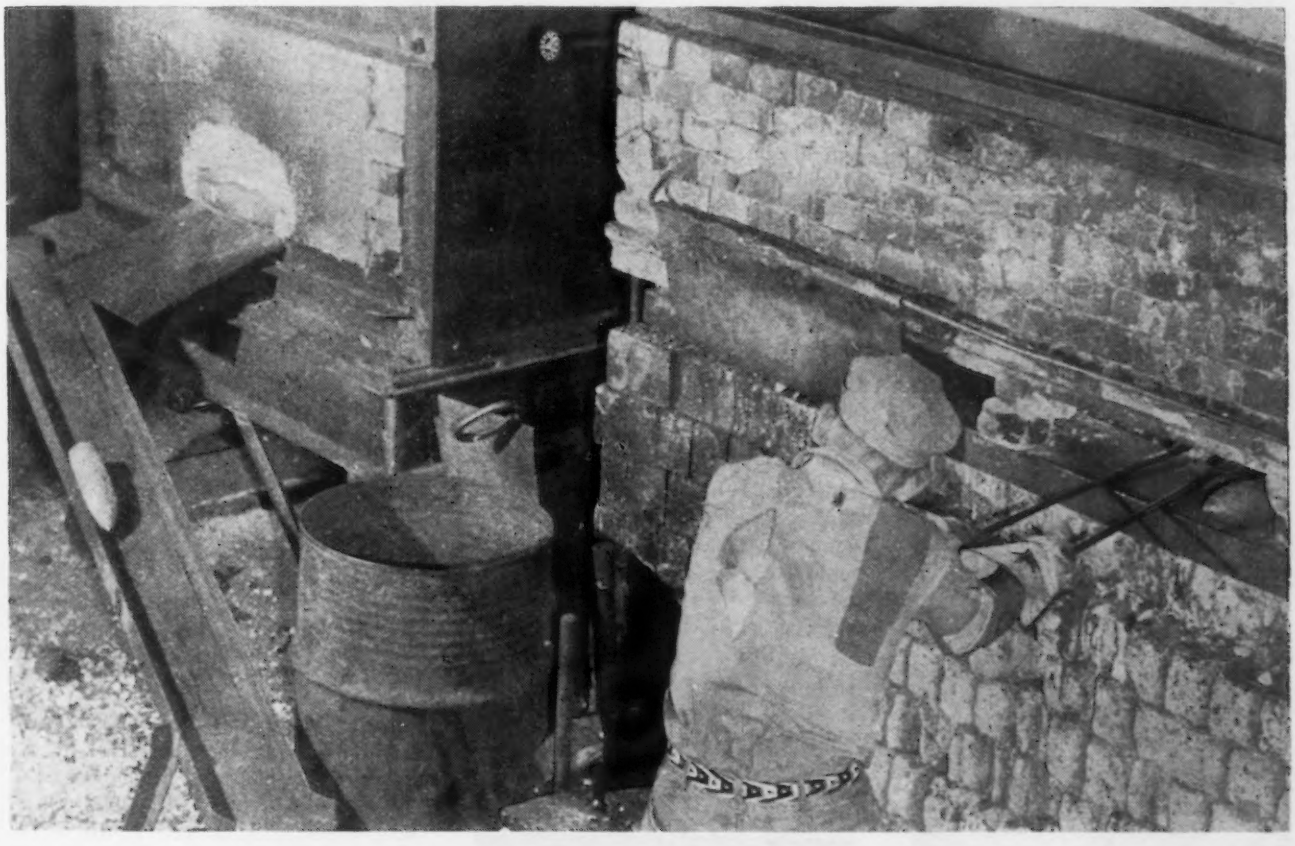


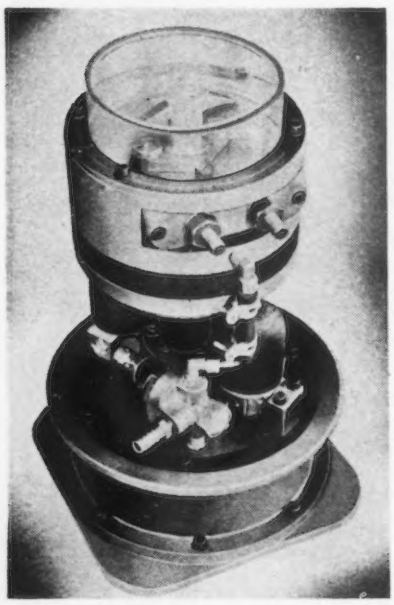
FIG. 4—Two furnaces are used to heat the steel. The pusher-type preheat furnace at the left kicks the shot out at 1200 deg. F. They are picked up by the heater, placed in the slot type furnace at the right and raised to forging temperature of 2100 deg. F.

New Equipment . . .

Welding

. . . New developments in arc welders and electrodes are described and illustrated in the following pages, as well as a number of interesting welding accessories.

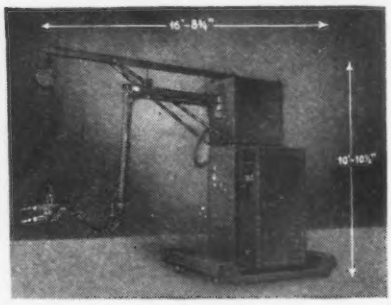
A HIGH-SPEED pneumatic arcless interruptor has been announced by *Sciaky Bros.*, 4915 West 67th Street, Chicago 38, to replace multiple magnetic contactors formerly used on its resistance welders of the electro-



magnetic stored energy type. Called the Dynatrol, this device interrupts the charging current without arc, not only reducing maintenance of contactors but increasing the efficiency of the system and resulting in 20 per cent operating speed. The Sciaky Dynatrol is essentially a high speed, normally closed, single pole interruptor, the contact points of which are shunted by a bank of capacitators. The contact is broken by impact of a pneumatically actuated piston on the contact plunger. Acceleration of the contacts is such as to prevent an arc discharge, while the primary current is directed to the capacitators. Immediately thereafter the energy stored in the capacitators discharges in the opposite direction through a damping resistor and the main reactor primary, thus tending to make the magnetic field collapse faster and increasing the secondary current approximately 20 per cent. The time of current discharge is also shortened. The Dynatrol is available on all Sciaky welders up to and including 50 kw. capacity.

Portable Spot Welder

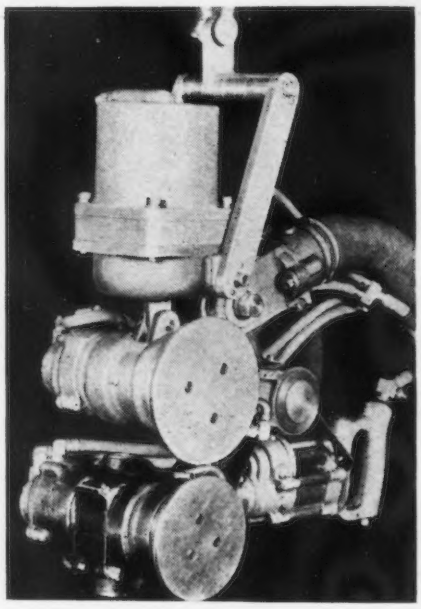
CROWDED and fixed jigs can be reached with this radial-type gun spot welder, especially designed for aluminum and light alloy. Tacking operations as well as structural welding on large or fixed aluminum structures can be accomplished. Developed by *Sciaky Bros.*, 4915 West 67th Street, Chicago 38, the machine employs the stored energy principle and variable pressure cycle. Known as Type PD2R-1, it is rated at 100 kw. and has a capacity for aluminum of from two thicknesses of 0.016 in. up to 0.064 in. The cables are mounted on the gun on horizontal water-cooled copper bars of heavy section. The control cabinet, main



welding reactor, monorail and special copper bars connecting the gun to cables are a self-contained unit. This is mounted on a stationary column and pivots 180 deg. on a vertical axis by means of ball bearings mounted inside the column.

Seam-Welding Gun

A NEW development in seam-welding in the form of an air-operated portable gun with which parts that are too big to take to the ma-



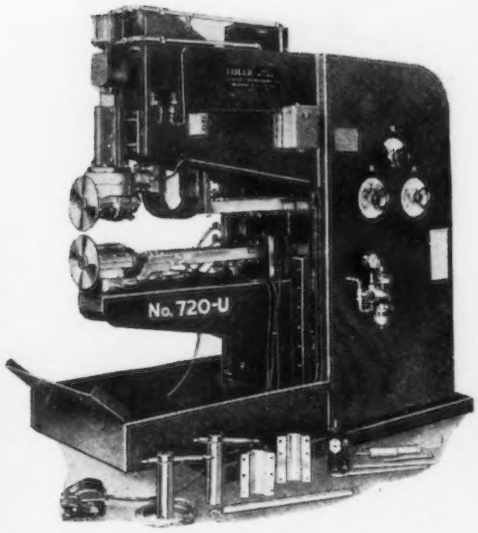
chine or large assemblies which are mounted in stationary fixtures can be seam-welded, has been announced by *Progressive Welder Co.*, 3050 East Outer Drive, Detroit 12. It will weld two thicknesses of 20 gage steel, including stainless steels. The gun is universally suspended and can be swiveled about so that the operator can weld horizontally or vertically.

Welding Positioner

THE Quickwork Div. of the *Whiting Corp.*, Harvey, Ill., has developed welding positioners to facilitate accurate downhand welding, reducing both cost and operating time. No overhead cranes are tied up during the welding process. They come in sizes ranging from small hand-operated units to machines with capacities of over 20 tons.

Seam Welder

THE universal resistance welder for heavy duty, placed on the market by the *Eisler Engineering Co.*, 740 South 13th Street, Newark 3, N. J., incorporates an air operated,



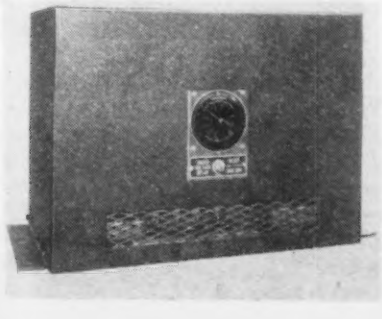
water cooled, automatic press-type welding machine of high capacity. It is adaptable for circular and longitudinal seam welding and, by a simple change of electrodes, for spot welding operation. Conversion from seam welding to spot welding is accomplished by removing the caps from the upper and lower turret and replacing the seam wheel shafts with proper spot welding horns. Complete automatic control of the entire system can be attained by connecting the unit with a mechanical or electronic contactor and welding timer.

Spot Weld Tester

THE S-A tensile tester, a machine made primarily to check the strength of veneers and thin plywoods, will do as complete and accurate a job on spot welded metals, according to *Streeter-Amet Co.*, 4131 North Ravenswood Avenue, Chicago 13. Hydraulic pressure is smoothly applied to the sheet metal in the tester and the breaking load in pounds pull is read directly from a dial without computation. No special training is needed to do the work.

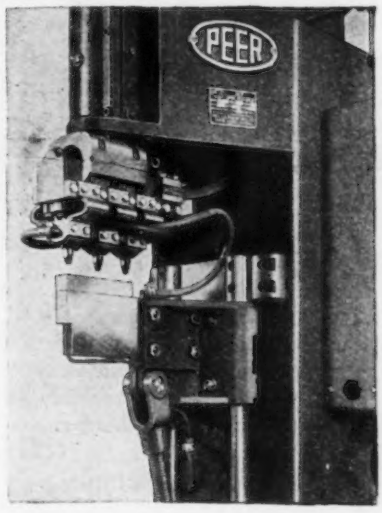
Welding Control

A THYRATRON welding control for providing precise control of low-capacity spot welders has been announced by the Industrial Control Div., *General Electric Co.*, Schenectady. Coupled with a suitable welding transformer, the control can be used for either welding tongs or a small bench welder and is particularly suitable for the spot welding of vacuum tube parts. Operating on either 230 or 460 volts, 60-cycle power supply, the control is an adjustable, synchronous electronic type in which only three thyratron tubes perform all the functions.



Multiple Welder

WORK on assemblies requiring a number of spot welds within close proximity has been speeded up through the use of hydraulically equalized multiple spot welding elec-



trode units, according to *Pier Equipment Mfg. Co.*, Benton Harbor, Mich. It is said use of these heads reduces the number of operations on a metal box requiring 52 spot welds to 14 operations. Accurate spacing and uniform pressures are obtained by the hydraulic equalization provided in the head.

A.C. Welder

"BUMBLEBEE" a.c. welders are now available in all-weather models of 300 and 500 amp. capacities, it is announced by *Wilson Welder & Metals Co., Inc.*, 60 East 42nd Street, New York 17. They have special moisture proof insulation and all parts are protected by a heavy coating of moisture proof paint. A low voltage contactor automatically

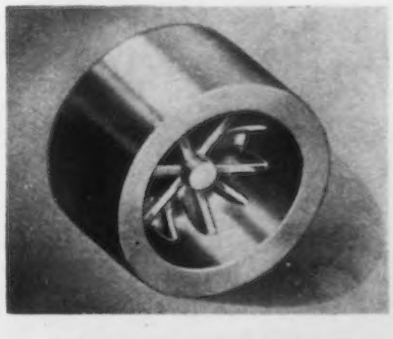
holds the open circuit voltage at approximately 40 volts. When the arc is struck, the contactor closes instantly and, when the arc is extinguished, this device immediately reduces the voltage back to 40 volts. The units are distributed by *Air Reduction Sales Co.*

All Position Electrode

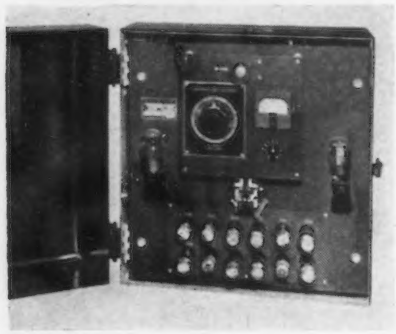
"RACO" Type H-D No. 11 a.c. electrodes are designed by the *Reid-Avery Co.*, Dundalk, Baltimore, to produce all-position welds. They are particularly adapted to X-ray welds such as are required in shipbuilding, pipeline construction, boiler work, etc. They may also be used on d.c. with excellent results. They conform to AWS E-6011 specifications. They are available in 3/32, ⅛, 5/32, 3/16 and 7/32 in. in 14 in. lengths and ¼ and 5/16 in. in 18 in. lengths.

Refrigerated Electrodes

A LINE of Frostpoint refrigerated resistance welding electrodes with replaceable Frostcaps of Mallory-3 metal has been brought out by *Frostrode Products*, 19003 John R, Detroit 3. Designed for welding operations requiring high electrode pressures, the new caps of high strength and hardness provide increased durability in severe, high pro-



duction service. Available in ⅝ or ⅞ o.d., they may be used with any standard or offset Frostpoint electrode.

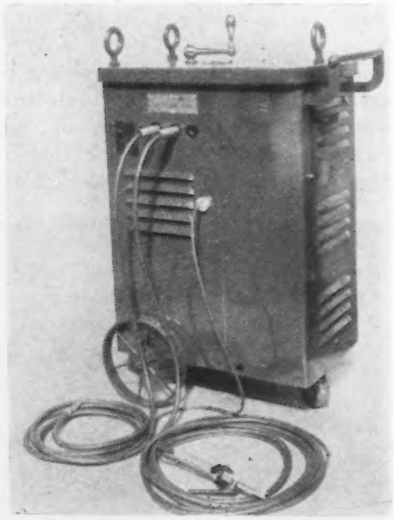


Regulating Compensator

A CURRENT-REGULATING compensator for resistance welding machines has been announced by the electronic control section of the *General Electric Co.*, Schenectady. After the predetermined heat-control setting for a particular job has been made on the compensator, it requires no further adjustment and will hold the welding current to a variation of ± 2 per cent. It consists of an electronic circuit which automatically retards or advances the firing point of the ignitron tubes used to control the welding current. It can be mounted on or near the welding machine.

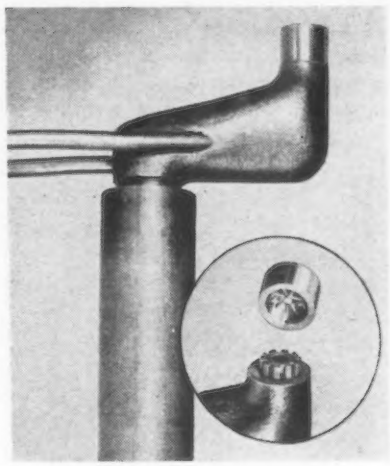
Arc Stabilizer for A.C.

WHEN welding thin gage metals where small electrodes and low welding currents are used to keep from burning the sheet, the a.c. arc becomes unstable and tends to go out easily, frequently spoiling the weld. The problem has been solved by superimposing a high frequency voltage wave (about 250 kilocycles) on the welding current. This high frequency voltage keeps the arc stream ionized during the reversals of the low frequency (60 cycle) welding current, and provides firm control of very small welding currents. This new welding stabilizer, developed by *Westinghouse Electric & Mfg. Co.*, East Pittsburgh, is said to have greatly expedited plane production and the manufacture of other products from thin gage metals.



Offset Electrode

AN offset spot welding electrode which can be effectively cooled at its tip has been made available by *Frostrode Products*, 19003 John R Street, Detroit 3. The cooling liquid enters below the knee and flows through the coolant guide into the finned, replaceable Frostcap which



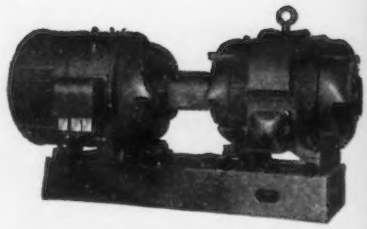
forms the electrode's tip, where the cooling action of the fluid is concentrated. The electrode is adaptable to any standard electrode holder.

A.C.-D.C. Electrode

A GENERAL purpose arc welding electrode for welding mild steel in all positions, with either a.c. or d.c., is announced by the *Lincoln Electric Co.*, Cleveland. There is said to be no slag interference when welding vertical down. The ability of Fleetwood 37 to withstand higher currents makes possible higher welding speeds than normal. It is especially desirable for light gage welding, however. It is available in the ⅛, 5/32 and 3/16 in. sizes in 14 in. lengths. Fleetwood conforms to AWS classifications E-6012, E-6013, E-7011 and E-7012.

Multiple Welder

WELDING power for 15 to 30 men welding at the same time is supplied by the a.c. to d.c. motor generator brought out by *Century Electric Co.*, 1806 Pine Street, St. Louis 3. The motor is a 160 hp. 440 volt, 60 cycle 3 phase 1160 r.p.m. squirrel cage induction motor with drip proof construction. It drives a 70 volt, 1500 amp. flat compounded d.c. generator, rated at 50 deg. C. rise for 1 hr. The machines are capable of being operated in parallel when large quantities of power are required.



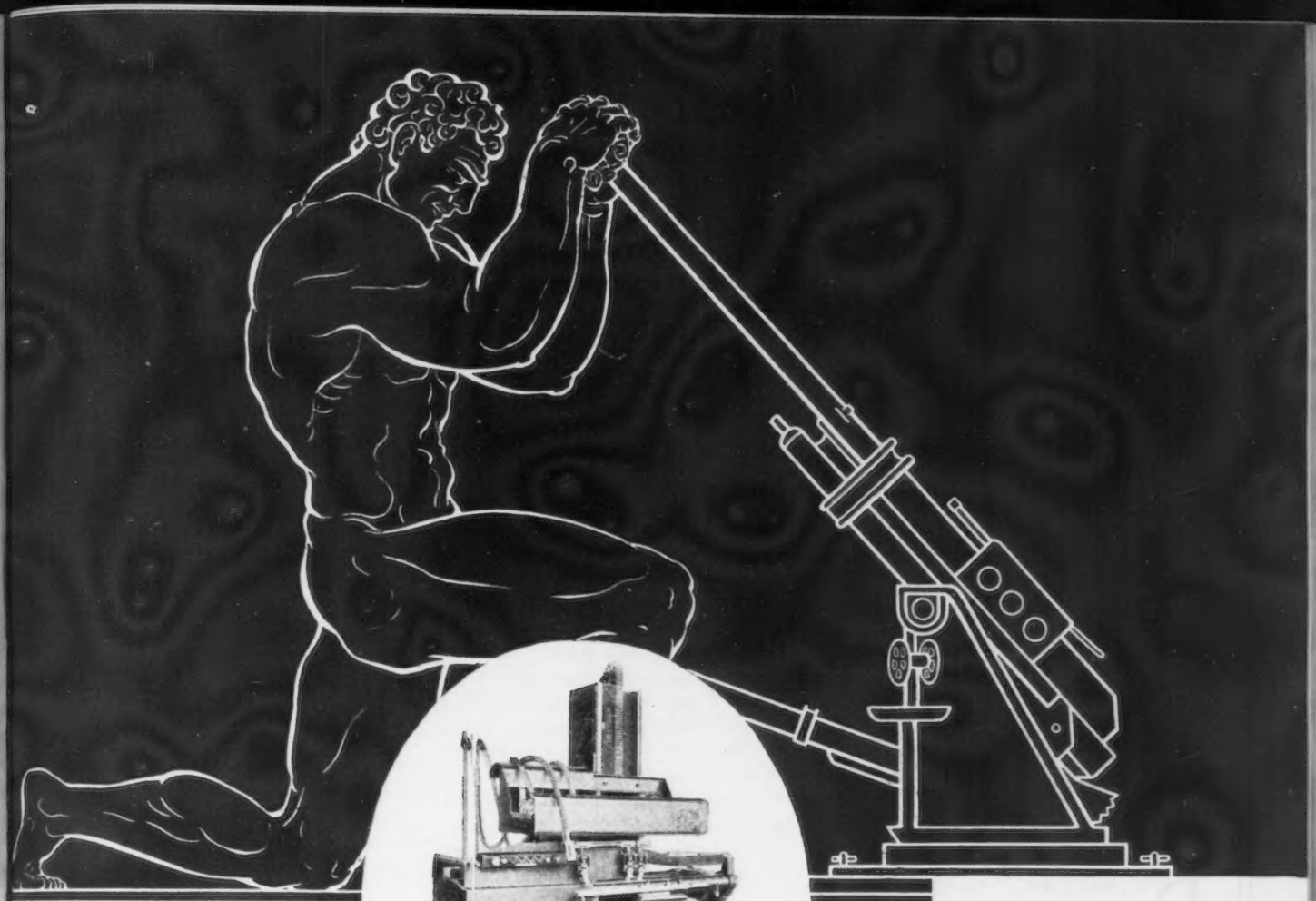
Metallic Soldering Flux

THE Mogul flux developed by the *Metallizing Co. of America*, 1330 West Congress Street, Chicago, has a lower melting temperature than soft silver solder on initial heats and once activated will work on temperatures slightly higher than 60/40 solder on aluminum and copper, cast iron, steel, etc. It is compounded of finely ground pure metals, balanced to attain high tensile strength and surface adherance. Tensile pulls of 2500 lb. per sq. in. are said to have been made without the metal deposit separating from the surface on both ferrous and non-ferrous metals used as a brazing agent.

D.C. Arc Welder

IMPROVEMENTS in its line of d.c., single-operator arc welders, Type WD-30 series, have been announced by the *General Electric Co.*, Schenectady. These welders are now equipped with two new control dials and a redesigned driving motor. One of the control dials is calibrated in

electrode size, the other in amperes. The control dials permit the welding current to be present without the aid of a volt-ammeter and the driving motor is designed to give exceptional resistance to the weather when the welding machine is operated outdoors.



Oilgear furnishes thousands of pounds of pressure to force gun barrels back against recoil, also the rapid reciprocation which enables gun to return to "battery" as in actual firing.

Latest Model Exercise Machine *

Guns get a move-on when Oilgear powers the push

A Gymnasticator, as you might guess, is an exercise machine. But this time it's for the recoil mechanisms of guns—these too have to be tested before they can be trusted. The job of exercising the recoil was formerly done by hand. It took hours and was inadequate. Now it's done with Gymnasticators—under conditions that actually and accurately simulate rapid fire—and the job takes *minutes*.

This too is another success story for Oilgear . . . the Fluid Power system that provides, among other things as in the case of Gymnasticators, tremendous power in small space, with rapid reciprocation. Possibly you need just this . . . *or* steplessly variable speed control . . . *or* hairline accuracy in control of movement . . . *or* force without motion . . . *or* any of a dozen other highly interesting functions for designers of post-war machines. The combination of experience and function which Oilgear engineers and Oilgear systems can bring to you may provide the right happy ending to your story too. Now is the time to find out . . .

THE OILGEAR COMPANY, 1303 W. Bruce St., Milwaukee 4, Wisconsin.

*Mfrd. by Jackson Hydraulic Machine Co., Inc., Rockford, Ill.

ARE YOU TRYING TO:

1. Apply large forces through long . . . or short . . . strokes at variable speeds?
2. Obtain automatic work cycles, variable speeds in either direction . . . with or without pre-set time dwell?
3. Apply large forces through continuous or intermittent reciprocating cycles at constant or variable velocities?
4. Obtain extremely accurate control of either position or speed of a reciprocating member?
5. Apply accurately variable pressure either static or in motion?
6. Closely synchronize various motions, operations or functions?
7. Apply light . . . or heavy . . . forces at extremely high velocities through either long or short distances of travel?
8. Obtain continuous automatic reversing drives at constant R P M or over a wide range of speed variation?
9. Obtain accurate remote control of speed and direction of rotation, rates of acceleration and/or deceleration?
10. Obtain constant horsepower output through all or part of a speed-range?
11. Obtain automatic torque control?
12. Obtain accurately matched speed of various rotating elements?
13. Obtain constant speed output from a variable speed input?
14. Obtain full pre-set automatic control, elimination of problems of shock, vibration, etc.?

You Need Oilgear!

OILGEAR

Fluid Power

Assembly Line . . . STANLEY H. BRAMS

• Aircraft piston rings and bearings are found in oversupply at Air Force depots, and cutbacks are ordered . . . Henry Kaiser leaves Detroit, casting a shadow over his postwar plans.

DETROIT—Air Force procurement officials have been going through their cupboards lately and finding some of the shelves embarassingly full. As a result, substantial cancellations of specific items have gone out to many suppliers. The overstuffing of the shelves results from excessive replacement ordering since the early days of the war. This hardly means that blame attaches to procurement officers. Without any bank of battle experience to go on, they had no choice but to take a chance-free course. This brought about supplies far in excess of need in many categories of requirements.

Piston rings are a notable example. Ordering of spares was in tremendous quantities, and battle experience later demonstrated that replacement requirements were actually in about half the proportion of ordering. Today, it has developed, there are millions of spare piston rings in Air Force depots. Realizing this condition recently, procurement officers cancelled original equipment and spare ordering in large amounts, and some of the spare rings appear to have been directed into the plants of engine manufacturers.

One factor in this overstock condition was an ordering in sizes for which need proved almost non-existent. For example, specification was made for spare rings in widths 0.002, 0.004, 0.006 and 0.008 in. undersize. But need for these widths was practically eliminated by the fact that pistons whose ring channels were undersize did not get into completed engines.

Oversize rings, with diameters 0.015 in. larger than standard, were ordered with the expectation of installing them in reground cylinders. But regrinding, it turned out, removed enough of the nitrided wall to cause junking of the part, thereby eliminating need for the oversizes.

Beyond those factors, of course, was simple over-ordering in all sizes. Volume of spares was reduced about a third last year, when battle experience began to form a pattern, but enlargements of stock have persisted.

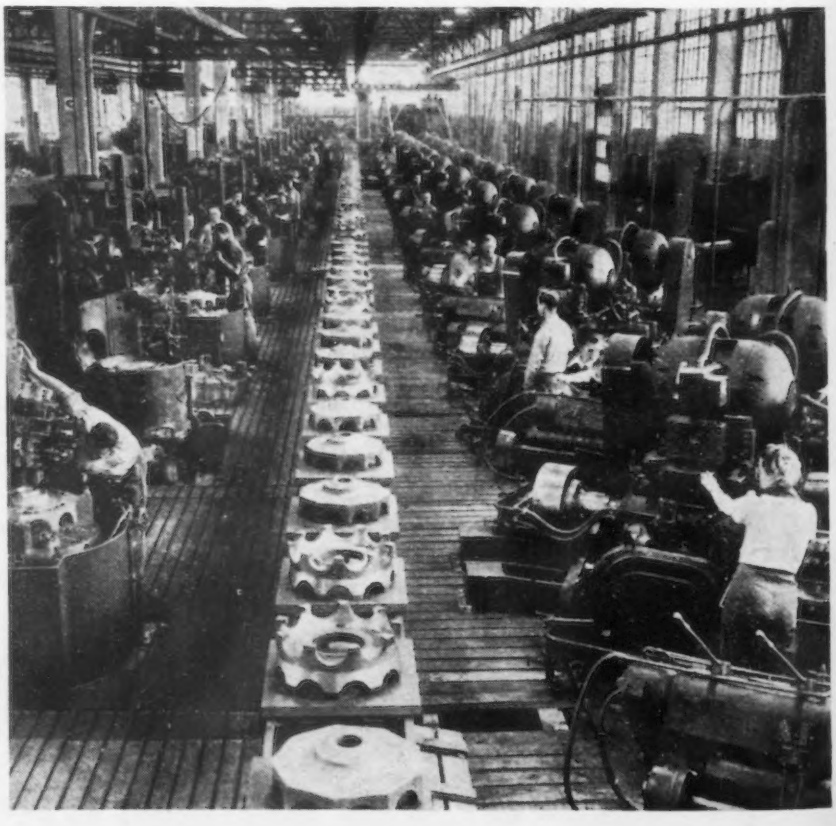
Piston ring companies' output has generally lagged behind the ordering, even after the 1943 cutbacks, so the immediate effect of the recent curtailments, has generally been simply to reduce backlogs and not to cause production declines of consequence.

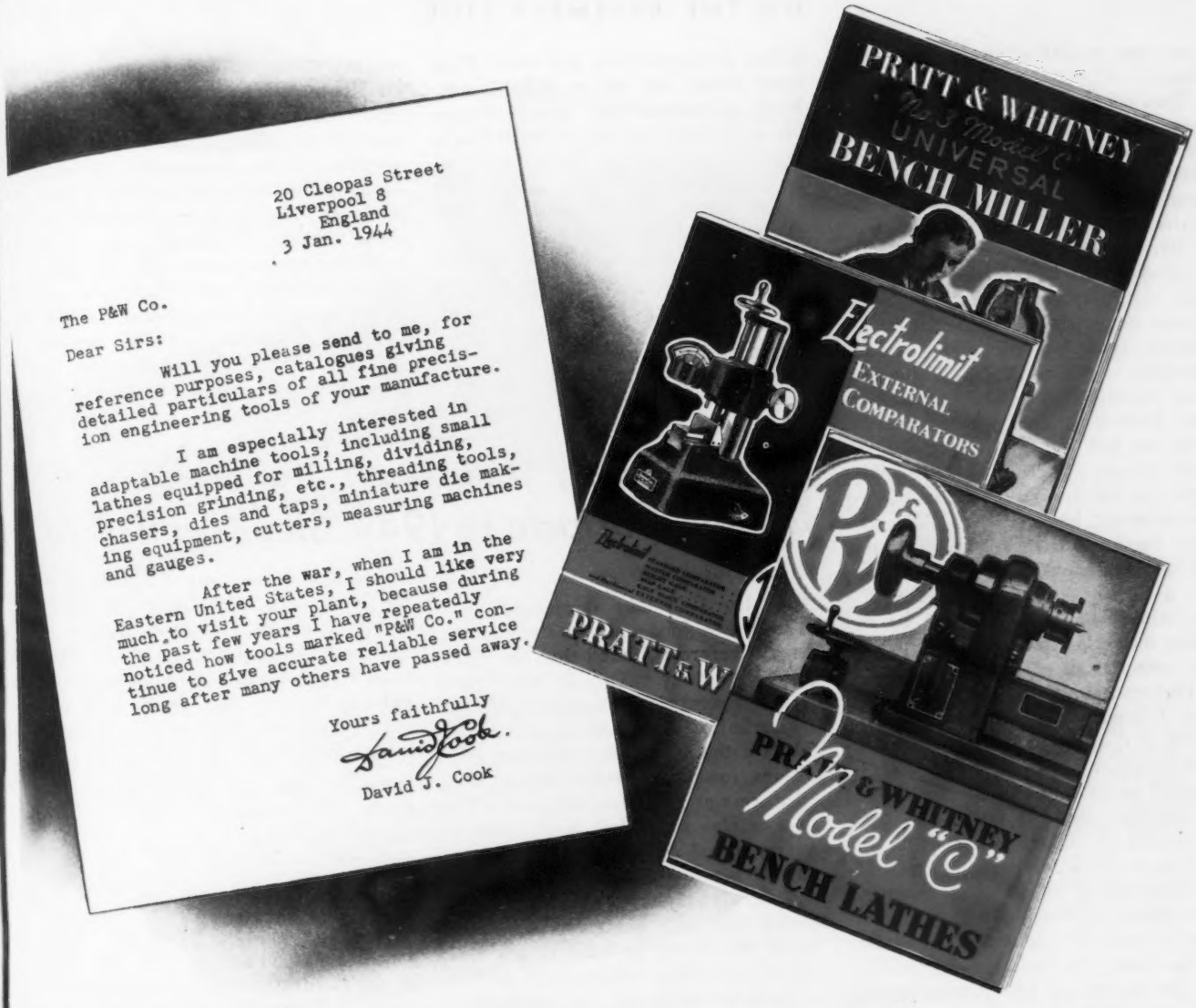
Certain types of bearings are also overstocked today. Bearings for one specific aircraft application are said to be on hand in Air Force depots to the tune of about 2,000,000 pieces —enough for a large volume of original equipment production ahead, with plenty of leftovers for spares. The Air Force contemplated the possibility of selling back this stock to the original manufacturers, but gave up when word came back that the value to the producers was only as scrap, at scrap prices.

In the case of these bearings, it might be added, the oversupply will create no change whatsoever in the tight and continually tighter bearings picture. Orders cancelled when the surpluses came into focus simply meant a reduction of long-term backlogs on the books.

THE Michigan Kaiser Co., automotive division of Henry J. Kaiser, moved its headquarters last weekend from Detroit to the Fleetwings Division of Kaiser Cargo, Inc., at Bristol, Pa. Meanwhile, development is continuing on a military vehicle designed by Karl Probst, Detroit consulting engineer, whose offices were absorbed some months ago by the Michigan Kaiser Co. The vehicle was completed during 1943, and presumably has been undergoing examina-

DODGE CHICAGO: *Chrysler Corp.'s Dodge Chicago plant, as evidenced by this photo, is in production. Here, crank case forgings are being machined. The major hurdle in getting the plant running has been the recruitment and training of employees.*




20 Cleopas Street
Liverpool 8
England
3 Jan. 1944
The P&W Co.
Dear Sirs:
Will you please send to me, for reference purposes, catalogues giving detailed particulars of all fine precision engineering tools of your manufacture.
I am especially interested in adaptable machine tools, including small lathes equipped for milling, dividing, precision grinding, etc., threading tools, chasers, dies and taps, miniature die making equipment, cutters, measuring machines and gauges.
After the war, when I am in the Eastern United States, I should like very much to visit your plant, because during the past few years I have repeatedly noticed how tools marked "P&W Co." continue to give accurate reliable service long after many others have passed away.
Yours faithfully
David J. Cook
David J. Cook
PRATT & WHITNEY
No. 3 Model C
UNIVERSAL
BENCH MILLER
Electrolimit
EXTERNAL
COMPARATORS
PRATT & W
PRATT & WHITNEY
Model "C"
BENCH LATHES

"They're in the mail, Mr. Cook"

Needless to say, we lost no time in forwarding all necessary information to our appreciative customer across the Atlantic.

This message of commendation from overseas illustrates, as nothing else can, the fulfillment of a promise — the promise of fine tool-making.

Now, as never before in history, precision tools are being given a chance to prove their worth — or drop out. In Britain, for even more years than here at home, precision tools have been taking the terrific, high-pressure beating of wartime mass production. Only phenomenal toughness and complete accuracy can stand up under this never-ending grind.

As Mr. Cook points out, long after other tools have reached the scrap-pile, *P&W tools can take it.*

PRATT & WHITNEY

Division Niles-Bement-Pond Company

WEST HARTFORD • CONNECTICUT

tion and modification by Ordnance then.

Two other companies are known to have submitted designs to Ordnance in this class, but the progress of these other entries does not appear to have been as pronounced as that of the Kaiser vehicle.

Mr. Kaiser's removal from the Detroit area may be interpreted to mean that the west coast ship builder has slowed down a bit in his headlong anticipations of building a postwar automobile. Although facilities for general manufacturing are available at the Fleetwing Division at Bristol, they are not well suited for automotive output. There are no machine tools at hand, and considerable revision would have to be done to provide facilities even for an assembly job as was envisioned sometime ago for a Kaiser postwar car. More apt facilities would be available in Detroit; Kaiser's removal carries with it the connotation of declining interest.

Perhaps, too, this move is a natural one following on the indication of WPB that the beginnings of automobile production resumption will be limited to those concerns in the field at the time the war broke out. This viewpoint is clearly conveyed in the fact that at the forthcoming April 17-18 meeting of automobile company presidents in Washington, no provision is made for potential newcomers to the field. Nor does the agenda hint at the possibility of ultimate quotas or even consideration for newcomers at the ultimate resumption of output.

THE viewpoint of the automotive industry is that so long as it is held under production control, fairness compels the closing of the field to outsiders. This attitude is based on the fact that the automobile business is the only one depending on distribution systems specifically identified with individual manufacturers. If one distribution system fails to obtain stocks while others do, it will die or join the others. If the auto industry succeeds in putting across this viewpoint in Washington, there would be good reason for Mr. Kaiser to consider narrowing his postwar automotive thinking.

On the postwar score, truck companies keep looking with displeasure at the possibility of military surpluses hanging over their heads when peace comes.

Some companies have explored the possibility of converting the 4x4 and 6x6 trucks which they are making for the government into commercial vehicles, driven by only one axle. They have found the job a difficult one. More is involved than simply removing a driving axle and substituting a shaft. Overall weight, frame construction, transmission, drive shaft, and other components are affected. The general conclusion seems to be that the military vehicles cannot be convertible to commercial use wherein economical operation, if not a necessity, is competitively most desirable.

Having reached this conclusion, the truck makers realize that these military models may be dumped onto the market, either through them and their distributor systems or otherwise, at prices which will make their conversion and use economically feasible. Consequently, a little star-gazing has been done, and tentative outlines have been made of means for conversion of these vehicles. Thinking seems to be revolving around a complete kit which would include a new front axle and requisite parts—a complete package for each type of vehicle. Beyond thinking in those terms, however, no concrete steps have been taken, so far as is known.

Lake Shipping Underway; Manpower Is Main Obstacle to 1944 Shipping Record

Cleveland

• • • **The 1944 lake** shipping is getting off to a good start with one major hazard before it, that being the manpower shortage. This is being further aggravated by promise of almost indiscriminate drafting of men under 26. On the other hand, lake ice conditions are considerably better than they were at this time last year. The fleet is also somewhat larger, due to a number of vessels having been added during the past two years.

The carriers have been worried recently due to a draft outlook which promised to take at least 10 per cent of the licensed officers and skilled seamen available for lake operations. This was particularly serious in the case of licensed officers whose services were strictly essential to operation of the fleet and presented a nearly insurmountable problem in the case of able-bodied seamen. In the case of the seamen even an ordinary six-month deferment was of little assistance, as six months of lake duty is required before an apprentice seaman can become a skilled, able-bodied seaman.

Some relief is expected as a result of Maj. Gen. Lewis B. Hershey's order this week effecting transportation personnel under ODT. Placed in the category of deferable occupations were captains and chief engineers on the Great Lakes and inland waterways and other licensed officers for the 1944 navigation season.

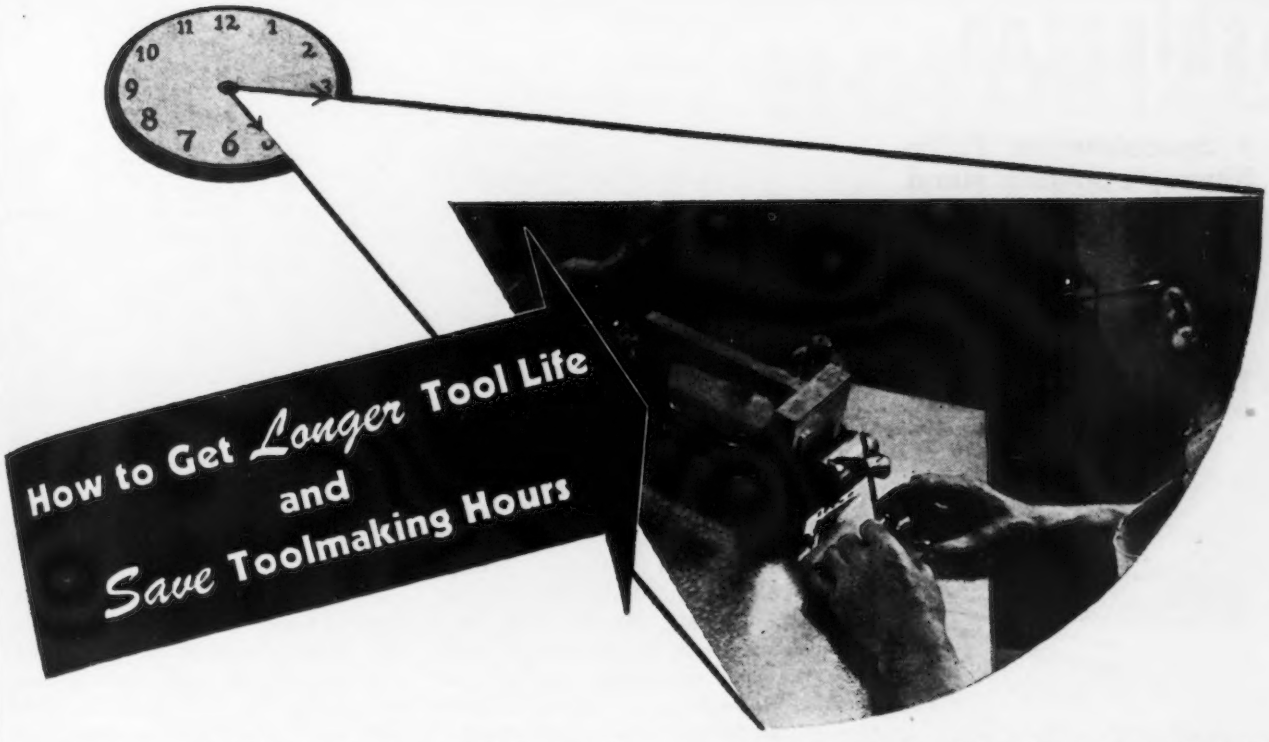
Ice and shipping conditions as reported April 6 were still serious, but Coast Guard cutters and ice breakers were working to open channels. Two ore ships of the Inland Steel Co. cleared Escanaba on April 5 and reached Indiana Harbor.

The first vessel load of Lake ore of the season reached Cleveland early April 11 on the Cleveland-Cliffs vessel, the *Colonel*. Carrying about 6000 tons, the load was picked up at Escanaba on April 8. The *Mudge*, a Hanna boat, also loaded at Escanaba on April 8, was also due on April 11.

Registration of the Great Lakes fleets for operation in 1944 reveals 321 steamers and seven barges in U. S. registry and 36 steamers and four barges in Canadian registry. Of these ships, 34 are self unloaders which will carry the season's limestone haul. The fleets carrying capacity per trip at 20 ft. draft for U. S. registered boats will be 3,036,000 gross tons, while Canadian vessels can haul 325,500 gross tons. The 34 stone carriers have a capacity of 377,616 gross tons per trip.

Shipping quotas set for 1944 include 90,000,000 gross tons of iron ore, 57,000,000 gross tons of coal, and 300,000,000 bu. of grain.

There has been some delay this season in chartering 16 vessels owned by the War Shipping Administration for operation in the lake traffic. Seven of these are large ore carriers, five of which have been converted from automobile carriers within the past two years. Nine others are small boats, some of which are said to have been in sea service during World War I and last winter served in the New England coal trade, but have since been returned to the lakes. The seven large ore carriers are reported to have been leased for operation this ore season. Nine smaller boats, which will undoubtedly require cost subsidizing by WSA, have not yet been chartered but are expected to be put into the grain trade.



How to Get *Longer* Tool Life and *Save* Toolmaking Hours

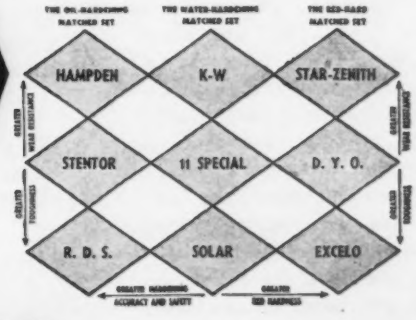
This might sound like a production man's dream of heaven, but it's happening every day. Longer tool life with corresponding savings in tool repairs and replacements is the result of the correct selection and heat treatment of tool steel. This is made possible by the Carpenter Matched Set Method.

The properties of these Carpenter Matched Tool Steels are so carefully dovetailed that you know in advance what the results will be as you switch from one steel to another for specific jobs. By simply following the arrows to the properties you need, you can find the correct steel for almost any tooling job.

Another important advantage of the Matched Tool Steels is in heat treatment. Not only are complete simplified heat treating instructions provided, but the small number of steels involved makes it easy for the hardening room to standardize on them. This assures more uniform results and protects the many hours that have gone into tool making.

To get the benefit of longer tool life and lower tool costs, put this method of simplified selection and heat treatment to work in your plant.

How the Carpenter Matched Set Diagram Goes to Work on Tool Steel Problems . . .



These nine steels will solve practically any problem in your tool room. They are really *Matched* Tool Steels, as one picks up its job where the other "leaves off".

The key steel is the one in the center, *No. 11 Special,* a straight carbon, tough timbre, water-hardening tool steel. When you have a tool to make, you first find out if it can be made from *No. 11 Special.* If the answer is "Yes", you go no further. But when the answer is "No", you use the diagram to point the way to the best tool steel for the job. For greater *wear resistance,* you go north. For greater *hardening accuracy* and *safety,* you move west, etc.

To learn more about the Matched Set Method, ask for a copy of the 167-page *Matched Tool Steel Manual.* It contains an 80-page Tool Index and Steel Selector that will be of special value to men responsible for tooling and tool production. For your copy, drop us a note on your company letterhead. Free to tool steel users in the U. S. A.

THE CARPENTER STEEL COMPANY
121 W. Bern St., Reading, Pennsylvania

Carpenter MATCHED TOOL STEELS

Washington . . .

L. W. MOFFETT

• Speculate on Philip Murray's political stand in forthcoming elections . . . Baruch expected to officiate in untangling manpower snags . . . Over $75,000,000,000 in war surpluses believed overhanging market.

WASHINGTON — The CIO-USWA dependence upon a political decision to establish a new stabilization formula and higher wages in exchange for the union's fealty in November may be bad strategy. At least, this opinion is being expressed with increasing frequency by those who believe Mr. Roosevelt is more interested just at this time in courting the conservative vote than he is in further insuring the already sure labor vote.

Of course, if the President dares to discriminate in his treatment of Philip Murray as compared with his capitulation to John L. Lewis and the UMW on the grounds that there is nothing more the Administration can do for labor without alienating millions of voters who belong to no unions or to independents, the CIO chieftan may lose face. He may figure that he will get most of the labor vote anyway.

This reasoning is directly opposed to the opinions of those observers who believe that since Mr. Roosevelt has established bargaining policy between the unions and the government instead of a stable labor policy, he cannot back-pedal now without losing his CIO support.

What Mr. Murray would do if the President turned his face away from CIO can be predicted from the example set by Mr. Lewis, who opposed the President in the last election. If it turns out that CIO has gotten out on a limb of a bargaining tree which the Administration helped to plant, and then if the Administration decides to cut that limb off, Mr. Murray is likely to become most outraged.

THE deciding factor is whether Mr. Murray, if in the highly improbable event he determines to go against the Administration, could deliver a substantial part of the CIO vote to the Republicans through the CIO Political Action Committee and its $700,000 war chest. Most observers think it doubtful he could, and maybe they are right.

In any event, a turn down by WLB and Economic Stabilizer Vinson, would leave Mr. Murray with little choice except to try to save his face in the most economical manner feasible. He might decide to string along with the Administration and swallow his pride and this is what Mr. Roosevelt may figure.

* * *

• **The turgid manpower** stew is ready for a little seasoning and clarification by the Office of War Mobilization. Indications are that Bernard Baruch may again be asked to do the officiating.

With no manpower policy except confusion employers and beleagured draft boards are now operating by ear. The draft-all-under-26 decision by the high command, as predicted, has turned into a free-for-all fight by industries and agencies for places on the super-critical list of industries whose essential young men may continue to be deferred.

The same coercive policy once applied to all workers in non-essential industry to drive them into war jobs, and which largely failed, is going to be applied to 4-F's. The alternative of being pressed into labor battalions, while it sounds fearful enough, will scarcely frighten many 4-F's into essential industries, if previous experience in this method counts for anything.

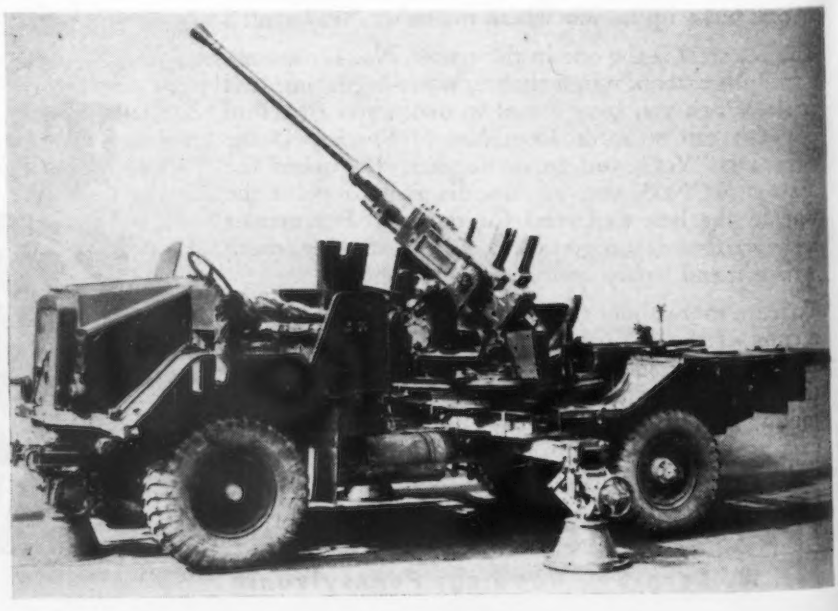
Employers aren't enthusiastic either. They can't imagine how valuable large groups of unwilling workers will be of any possible use. Meanwhile, the chance of using these men for limited service within this country is being over-looked by the Army.

* * *

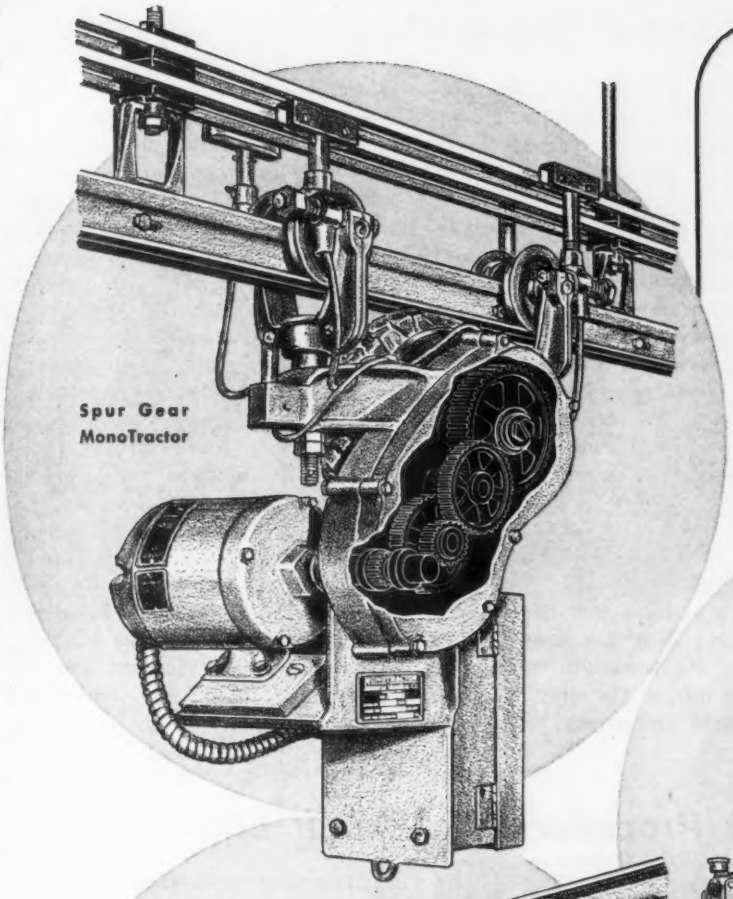
• **Pre-election Farm** bloc and Administration pressure in Congress seems to guarantee that the nearly 613,000 young men under 26 years old deferred on farms will remain so, despite the fact that the high command is willing to take a cut in war production to get industry's young men into uniform. Selective Service says that approximately 530,000 of these men are not fathers.

Selective Service Director Hershey recently withdrew his 16-unit agricul-

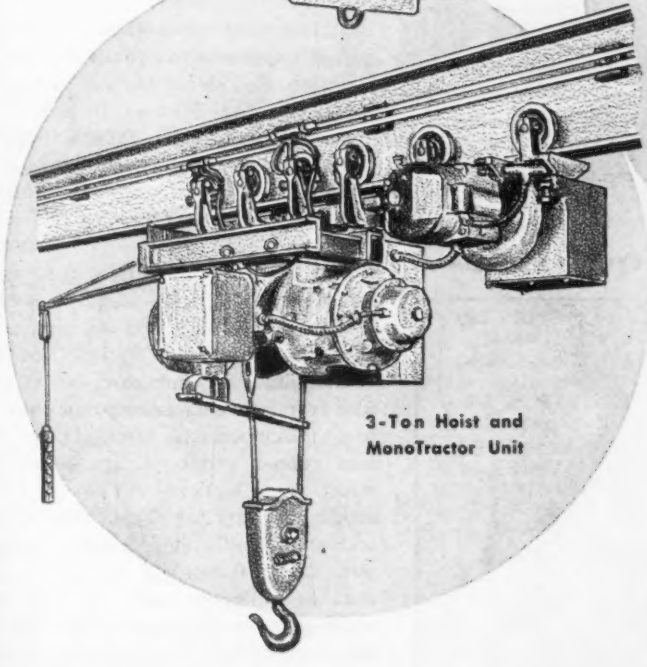
MOBILE BOFORS: *This British Bofors was given added mobility by being mounted on a Morris chassis. It will speed along roads at 40 miles per hr., a characteristic quite useful in a defensive emergency.*



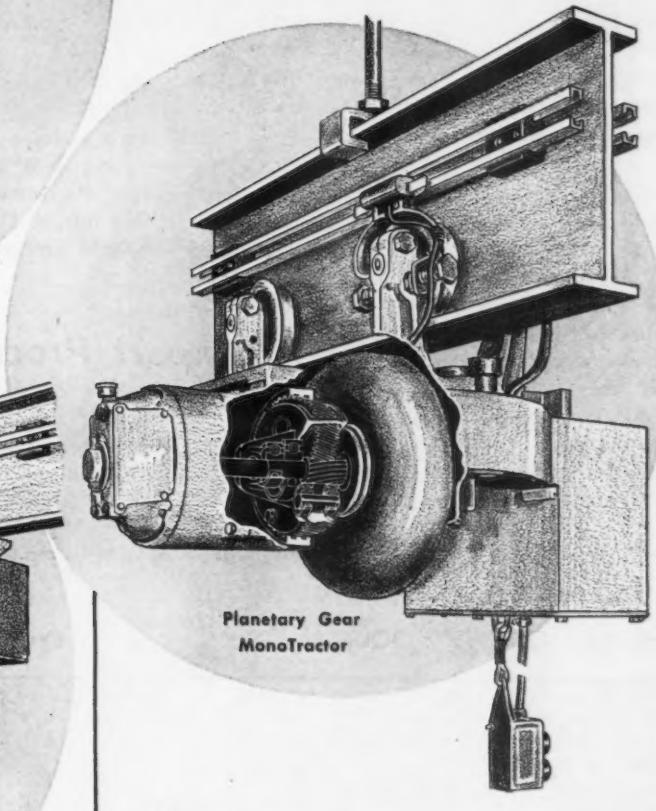
MOTORIZE
YOUR
OVERHEAD Handling
Get Increased Return From
MONORAIL EQUIPMENT



Spur Gear
MonoTractor



3-Ton Hoist and
MonoTractor Unit



Planetary Gear
MonoTractor

● **Let an American MonoRail Engineer explain the advantages of motorized overhead handling equipment in your plant. Write today.**

THE AMERICAN MONORAIL CO.
13103 ATHENS AVENUE CLEVELAND 7, OHIO

AMERICAN MonoTractors with pneumatic tires inflated against the bottom of track provide transportation for carriers, hoists, and cranes. Increased tractive contact of the tire against the flat rail furnishes greater draw-bar pull required to handle heavy loads up or down grades and around curves, under perfect control. Compact electrification, together with many exclusive control features of the American MonoTractor, permits the application of automatic equipment to handling problems in nearly every industry. Costs are reduced in direct proportion to the number of man-hours saved.

tural standard as a prerequisite to farm deferment which was designed to supply the services with excess young men from the farms. Since then, however, he has issued instructions to draft boards to defer only absolutely essential farm workers. This would seem to leave the operation of the Tydings Act practically undisturbed, an act which the draft boards have construed almost as a mandate not to draft any agricultural worker.

The upshot is that industry takes the rap, and thousands of older employees working in cities and holding jobs recognized as essential by Selective Service will have to get into uniform regardless of their occupational or dependency status.

* * *

• **Government and industry** have accepted the estimate that there will be from $75,000,000,000 to $100,000,000,000 in war surpluses overhanging the market after the war. It is not believed that there is any figure which can be considered reliable for any class of property except war plants because of the factors governing the size of possible surpluses.

In the first place, it is not known how large the Armies of occupation will be, nor what share of this burden this country will be called upon to bear. The Bureau of Labor Statistics has said that there will be a 2,000,000-man armed force after the war, but the War Department has not given any indication what it thinks is a proper force and it must be emphasized that there is still Congress to be heard from. Secondly, it is not known what the size of the standing Army in the United States will be, whether there will be compulsory military training, and whether State National Guards will be reformed and continued. And lastly, nothing is known about the duration of occupation, nor how much material will be sold to occupied countries to build up their military machines.

The world armies will have to be equipped, and it is not known what percentage of American equipment will be lost during the war, nor how much obsolete equipment will never be returned to this country, and consequently must be sold abroad.

Whatever surpluses develop to compete with postwar manufacturers, it will not be possible to estimate their impact because it may be many years before it is discovered whether there was a surplus or not. The determining factor is what the Army wants to declare surplus and it is well known that the Army policy of always keeping as well supplied as possible will continue into the peace.

Therefore, it may well be that all of the dither indulged in by everyone over the question of surplus property, and its effect on the postwar economy will prove to have been most futile. One question remains, however. What degree will the peacetime Army permit its supplies to be used for relief, either domestic or foreign and how will this effect domestic politics and foreign policy?

Export Procedures to Brazil Eased

Washington

• • • **The Foreign Economic** Administration has notified exporters that effective April 1, 1944, all commodities except a relatively few tight-supply items have been removed from the decentralization procedure which required exporters to submit Preference Request Recommendations with applications for licenses to export to Brazil. In addition, FEA announced that import recommendations are no longer needed with applications to export six commodity groups to Colombia and Venezuela.

The only commodities for which Brazilian Preference Request Recommendations still must accompany license applications include certain chemicals, coal and coke, steel, iron and iron products, non-ferrous metals and miscellaneous minerals, rubber and rubber products, and wood and wood manufactures. The six commodity groups for which import recommendations are no longer required with applications for licenses to export to Colombia and Venezuela are automotive replacement parts and accesories, spark plugs, motor vehicle engines, ball and roller bearings, and asbestos metallic yarn and friction materials.

The action announced today represents a further simplification of export controls brought about through a series of modifications of the so-called Decentralization Plan. Under the original Decentralization Plan for regulating exports to Latin America, it was necessary for U. S. shippers to submit special import recommendations (called Preference Request Recommendations in Brazil) along with their applications for licenses.

THE BULL OF THE WOODS — BY J. R. WILLIAMS

WAIT NOW, WAIT.! I AIN'T GOT IT DOWN YET!
YOU'LL HAVE IT DISSOLVED IN YOUR MOUTH-- YOU'VE DRANK TWO GALLONS!
YOU'RE USIN' UP ALL THE ENERGY IN THE LAST ONE GITTIN' THIS ONE DOWN!
THREE ELBOW RANGERS TAKIN' THEIR VITAMIN PILLS
ALL THEY DO ALL DAY IS LEAN ON A MACHINE-- I GUESS TH' VITAMINS GIVE THEM MORE LEANIN' POWER!
J.R.WILLIAMS 4-14
"MORE POWER TO YOU"
T M REG U S PAT OFF COPR. 1944 BY NEA SERVICE, INC

Checks INTERNAL AND EXTERNAL DIMENSIONS

To MILLIONTHS of an Inch

UNUSUAL FEATURES FACILITATE FAST AND ACCURATE OPERATION

Model N-4 Internal-External Measuring Instrument is an entirely new Sheffield development for Toolroom and Gage Laboratory use in checking master and working gages, setting snap gages, etc.

- Checks internal dias. of ¼" to 12".
- Checks 3" max. depth of hole, 1 side.
- Checks external dimensions up to 12".
- Gaging arms elevated electrically.
- Indicator automatically shows height of gaging arms.
- Signal lights facilitate setup.
- Positive electrical magnification of 2500 to 1 with Electrigage.
- Linear scale of .012" range graduated in 50 millionths.

WRITE FOR ENGINEERING DATA AND PRICE

ARMY E NAVY
SHEFFIELD MASTER CRAFTSMEN

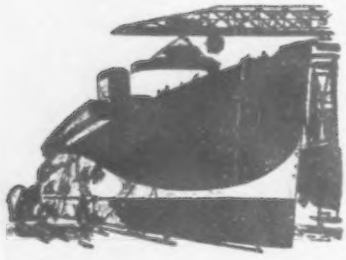
THE SHEFFIELD CORPORATION

Dayton 1, Ohio, U.S.A.

MACHINE TOOLS • GAGES • MEASURING INSTRUMENTS • CONTRACT SERVICES

WEST COAST . . . OSGOOD MURDOCK

• Portland, once a labor surplus area, now is critically short . . . Takes position from Seattle as No. 1 steel consumer in West . . . Nucleus for postwar chemical industry.



PORTLAND—As late as 1942, in a prospectus for the local subcontracting and fabricating pool, Oregon Industries Inc., publicist Joseph R. Gerber pontificated as follows: "Portland is one of the few areas in the United States where a labor surplus exists." How he would like to swallow those words and how Oregon industry wishes they were still accurate. Instead, in the rumbling, brown, one-man, narrow-gaged local street cars are double cards for Albina, the Happy Hellship Yard, where they also produce Slaughter Sloops, inviting 3000 more workers to come down and see Bill "Pigsfeet" Moore and go to work. Prominent bill boards of Realtor McGuire urge local townspeople to "sell that house now — Portland's greatest boom — record high prices." Two years have shaken this local world, socially and industrially.

Traditionally Seattle was the steel headquarters of the Pacific Northwest, with most district sales offices, two mills, and extensive warehouse and supply stocks. Although there has been no loss or let-up there, the Portland market has forged ahead, so that a greater monthly tonnage of steel products has been chewed up here consistently for the past year. As the Liberty ship program, with its 24 hulls a month, was converted to Victory's, at the rate of only six for the first two months, everyone expected a severe drop. Instead, resourceful local foundries, machine shops and subcontractors are continually replacing former outside sources of more components, to make the overall production each month greater than any previously. As one walks the streets or rides the highways he can hardly open a door, peer behind a fence or examine a loft or basement without meeting lathes, welding torches, or crude sub-assembly lines.

When Iron Fireman's special marine propulsion engine war plant mysteriously burned one night a few months ago, the contract was so nearly completed that DPC decided not to rebuild. So the turbines for Victory cargo and troop vessels, and other ships are now being built in the four big and six or eight husky smaller yards here are all shipped in. Even that hasn't slowed the pace.

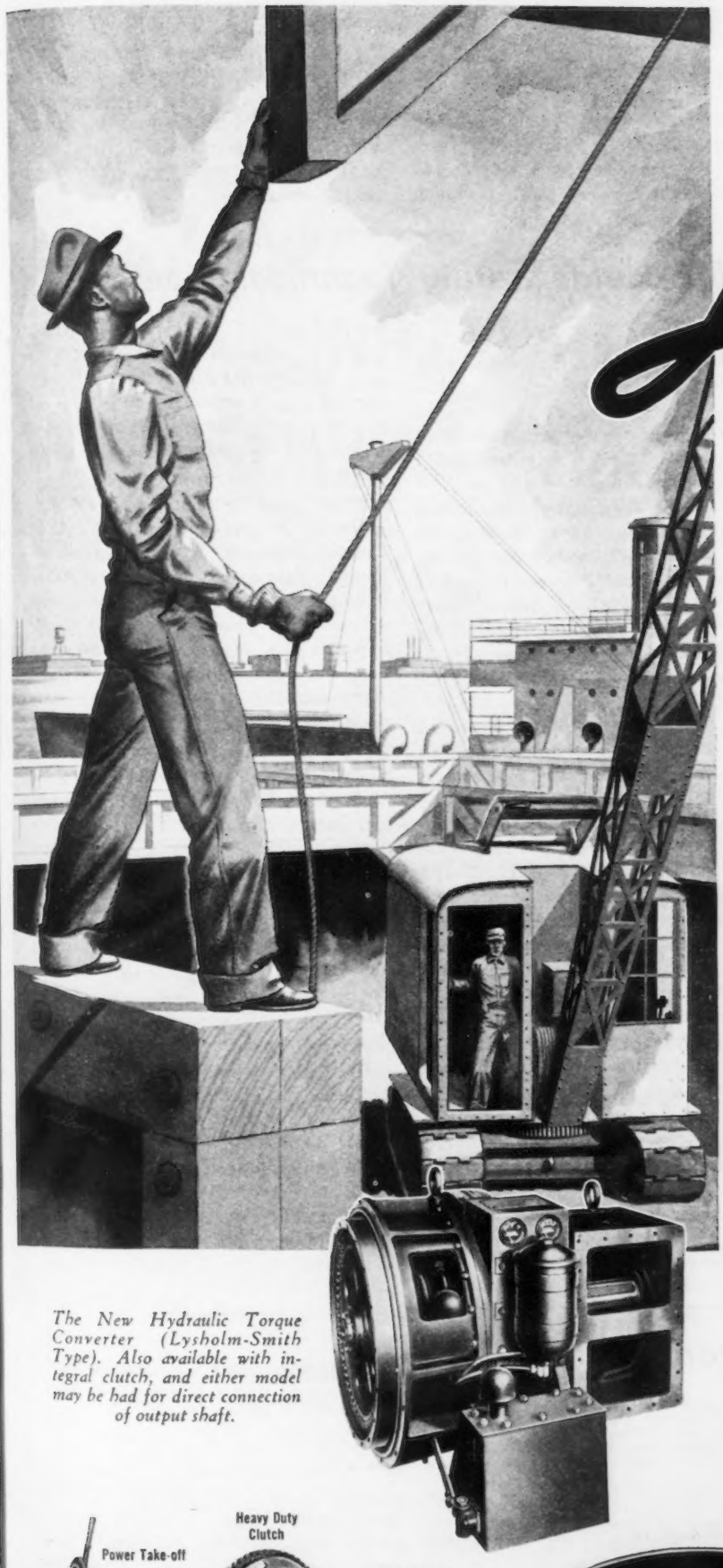
Columbia Steel Castings' newer No. 2 Plant is a big operation in any market and one of the major steel foundries on the Pacific Coast. There are five or six other big, busy, competent plants for steel casting, all turning out fittings and castings for ship construction. Schmitt Steel Co., has added drop forging and upset forging equipment within recent months, with two 800-lb. hammers now in operation and a 1600-lb. hammer on the way. With half again as many men the manager of Schmitt declares he could turn out twice the work, but the firm is now processing 1000 tons of steel a month, which is grist for any mill in this region.

A NEW, promising source of steel foundry sand is just around the corner and looks extremely interesting. Within two months Silica Products Oregon, Ltd., will have in operation a plant near Eugene capable of washing, screening and drying 200 tons per eight hr. shift. The Oregon State Department of Geology and Mineral Industries reported that U. S. Bureau of Mines drillings verify a deposit of several hundred thousand tons of high silica sand made up almost entirely of quartz grains of subangular shape. Laboratory and foundry tests in comparison with Ottawa Federal 17 sand, commonly used in this area, are cited to show that the Oregon sand has a grain size more uniform and a little finer, that the green strength values are at least equal and the dry strength greater, and that permeability and durability are comparable and satisfactory for steel foundry requirements. A freight rate of $4.40 has been granted to San Francisco Bay points which will make the sand available to central and northern California as well as to Pacific Northwest foundries.

ALERT interest in chemical and electro-chemical possibilities of the Pacific Northwest has supplanted somewhat the electro-metallurgical boom of a year ago. When a well known chemical company recently bought the well-established independent plants of I. F. Laucks, Inc. at Seattle, principally known for its patent soya bean process for plywood glue, another national operator entered this field. Du Pont is in charge of huge war-time developments in this area which are believed to have important long-run implications.

Two significant full-scale experimental plants are being built with particular bearing on the native lumber industry. Near Bellingham, Wash., a $1,000,000 DPC plant of 2,000,000 gal. annual capacity will refine ethyl alcohol from waste sulphite liquor in connection with the plant of the Puget Sound Pulp & Timber Co. Near Eugene, Oregon, the chemical division of WPB has authorized the Willamette Valley Wood Distillation Co. to proceed with a $2,200,000 plant to make 10,000 gal. of alcohol per day at the rate of 50 gal. per ton of sawmill wood waste now surplus in this area. In addition 500 lb. of lignin are derived from each ton of raw material. This enterprise is actively fathered by Orville Miller, president of the West Coast Lumbermen's Assn.

PORTLAND'S year-old rolling mill that was sick nearly unto death so soon after it was born is apparently thriving on a war-time diet of emergency orders for rounds (¾ through 4-in.), flats (1.5 through 6-in.) and half-rounds (1.5, 2, 2.5 and 3-in. sizes). Soon a full range of angles will be available. Up to 4000 tons a month are now being rolled



The New Hydraulic Torque Converter (Lysholm-Smith Type). Also available with integral clutch, and either model may be had for direct connection of output shaft.

Lift

FOR BETTER LIVING

Even legendary magicians would have been hard pressed to match the feats possible with modern cranes. The swinging arms of these mechanical giants have freed men forever from the back-breaking drudgery of lifting heavy loads. Without cranes to do big jobs better and faster, all heavy goods produced for man's comfort, protection and convenience would cost each of us much more in both money and labor.

Like industrial machinery in numerous other fields, many cranes have their power applied and controlled through Twin Disc Hydraulic Torque Converters. The Twin Disc Clutch Company brings more than 26 years of industrial clutch-building experience to jobs like giving these giants smooth muscles. Industrial machines of all types operate more smoothly, economically and efficiently when the inbuilt stamina and reliability of Twin Disc power links are added to their other characteristics.

Besides hydraulic drives, the Twin Disc Clutch Company produces a complete line of friction clutches for practically every industrial application. Consequently, you can obtain here the kind of unbiased clutch counsel that considers the needs of your equipment *first*. Application data, specifications or any other details about Twin Disc products to help with your present problems or future plans may be had for the asking. TWIN DISC CLUTCH COMPANY, Racine, Wisconsin, (Hydraulic Division, Rockford, Illinois).

from the 20 and 14 mill, and in June the second furnace will double the plant's ingot capacity. A smaller 12 and 9 mill will be in operation later this year or early in 1945. Hesse-Ersted Iron Works are in charge of the operation and a skilled mill crew has been developed. Plentiful low-cost high-grade scrap locally available is favorable to this plant. Sales policies of a conciliatory and cooperative character aim to popularize this little plant with local industrial and warehouse customers and even with competitors.

Traditionally O.S.C. has stood for Oregon State College hereabouts, but these past two years it has been appropriated by Oregon Shipbuilding Corp., the last of whose 330 Liberty ships was delivered Feb. 5. The big 11-way national-record-holding Kaiser yard has completely changed over to turbine-driven, double-the-man-hours Victory ships. Contrary to expectation, the Victory has not been much longer on the ways than the Liberty, but outfitting time is tedious. Temporarily the yard is out of balance, with terrific demand for electrical and sheet metal workers. Unions have relaxed classification barriers temporarily to make a maximum of outfitting labor available. During the past year the associated Vancouver yard has turned out 39 escort carriers, and the also associated Swan Island yard has produced 56 tankers in 21 months. The three yards employ over 90,000 workers.

In a recent personal survey of 81,881 of these workers jointly sponsored by the management and local postwar planning authorities, it developed that only 14 per cent of these workers have any postwar personal plans for employment. Half of all present workers come from states other than Oregon and Washington, two-thirds of those employed have not been resident in Portland as long as three years, but 60 per cent would like to stay if they can find employment. Only 26 per cent were skilled workers before they entered the yard, 20 per cent were common laborers, 13 per cent were white collar workers, and others were housewives, farmers, professional men, etc. Few had complaints and most were buying bonds, furnishing a home and saving some money.

ASME Holds Spring Technical Meeting

Birmingham

• • • **To an audience totaling** more than 400, papers dealing with a wide variety of subjects were presented at the spring meeting of the American Society of Mechanical Engineers, held here April 3, 4 and 5.

Among the highlights of the meeting were addresses by Robert M. Gates, New York, society president, on "Engineers and Postwar Industry" and by Maj. Gen. G. M. Barnes, chief of the technical division, Office of the Chief of Ordnance, Washington, D. C., on "Keying Research to Battle Problems."

"Praising the part of engineers in war production, Mr. Gates asserted that "even more will the peace be a peace of engineers."

Gen. Barnes told the convention delegates that America has been able to keep well ahead of German and Japanese weapons, but "it would be a mistake," he added, "to give you the impression that the Germans are not doing their best to produce new weapons in nearly every category."

"In this war," he pointed out, "ordnance must function equally well at the Arctic Circle or in the dank jungles of New Guinea."

In a paper prepared by Charles Froesch, chief engineer of Eastern Air Lines, Inc., and presented by Walther Prokosch of the company's engineering department, Mr. Froesch said " the first postwar decade will be the most critical for the air transport industry." As affecting scheduled air transportation, he said, success or retarded development would depend upon correct interpretation of the economic factors created by the war and upon factual analysis of the problems faced.

In a paper entitled "Aircraft Engines on the Production Line," H. E. Linsley, Paterson, N. J., technical advisor to public relations, Wright Aeronautical Corp., said "compressing into a scant four years the normal developments of a quarter of a century has been the achievement of the Wright Aeronautical Corp. in the field of aircraft engine manufacture."

Among other papers presented at the three-day meeting was one by A. H. Roosma, assistant manager, Southern District, Republic Steel Corp., on "Introduction of Work Simplification in the Steel Industry"; by J. G. Morrison, metallurgist, Landis Machine Co., "Nitriding of Hardened High Speed Steel Tools"; E. J. Janitzky, metallurgical laboratory, Carnegie-Illinois Steel Corp., "Machinability of Steel and its Relation to Yield Stress Ratios of the Same Tensility."

By G. B. Berlien, chief metallurgist, Lindberg Steel Treating Co., "Subzero Refrigeration Applied to Tool Steels"; S. D. Moxley, chief engineer, American Cast Iron Pipe Co., Centrifugal Casting of Steel"; E. V. Camp, president of E. V. Camp & Associates, "Description of Manufacture of Heavy Cast Steel Anchor Chain."

. . . Cited for Awards . . .

• • • **The following** companies have won the Army-Navy E award for outstanding war production:

Artos Engineering Co., Milwaukee.
Atlanta Woolen Mills, Inc., Atlanta.
Atwood Vacuum Machine Co., Auburn Mfg. Co., Automotive Plant, Auburn, Ind.
Balloffet Dies & Nozzle Co., Guttenberg, N. J.
Bendix Aviation Corp., Scintilla Magneto Division, Sidney, N. Y.
Electric Sprayit Co., Sheboygan, Wis.
Evans Products Co., Plant No. 1, Detroit.
Ford Motor Co., Ypsilanti Plant, Ypsilanti, Mich.
General Aniline & Film Corp., General Aniline Works, Grasselli Plant, Grasselli, Union County, N. J.
Ithaca Gun Co., Ithaca, N. Y.
Lion Oil Refining Co., Lion Chemical Corp., Ozark Ordnance Works, El Dorado, Ark.
Littlefuse, Inc., Chicago.
Machined Metals Co., West Conshohocken, Pa.
National Union Radio Corp., Lansdale Plant, Lansdale, Pa.
PittsburgMidway Coal Mining Co., Military Chemical Works, Inc., Baxter Springs, Kan.
Ray-O-Vac Co., Blake Mfg. Co., Clinton, Mass.
Remington Rand, Inc., "C" Division, Syracuse, N. Y.
Smith Devices, Philadelphia.
Melvin L. Smith Laboratories, Kane, Pa.
Spraling Brothers Machine Co., New Bedford, Mass.
Reed Products Div., Standard Products Co., Cleveland.
Western Electric, Inc., Teletype Corp., Chicago.
Lodge & Shipley Machine Tool Co., Cincinnati (fourth star).
Aro Equipment Corp., Cleveland (first star).
Cincinnati Industries, Inc., Cincinnati.

Manganese and Chrome Ore Sales Exempted by OPA

Washington

• • • **Transactions** involving the sale or delivery of 500 lb. or less of either metallurgical manganese ores or chromium ores will be exempted from price control beginning April 15, OPA announced in amendment 4 to MPR 248 and amendment 4 to MPR 258. Small quantities of these ores are commonly used for experimental purposes by educational and private laboratories as well as industries.

What will Users Want from POSTWAR Machine Tools?

4 BETTER FINISH

Among competing products, the one having the best machined finish almost always has the advantage—other things being nearly equal. It is a natural human trait to associate good finish with good quality.

And, experience with airplane engines has shown that finish is frequently important even when not visible. Airplane engine builders do much careful finishing on parts that are rarely seen . . because it has been found that finish is a powerful factor in eliminating fatigue cracks, hence fatigue failure.

By equipping machines with Vickers Hydromotive Controls, better finish can frequently be obtained without added cost and without extra operations. For example, smooth and uniform feeds can be secured regardless of variation in work resistance or hydraulic pressure. Vibration, backlash and override are usually easily eliminated . . . smooth reversals and constant cutting speeds on varying contours are also readily obtainable.

Better finish is only one of many advantages obtainable with Vickers Hydromotive Controls. Let Vickers Application Engineers discuss them with you.

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Application Engineering Offices:
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CONSTANT DELIVERY PUMPS

CONTROL ASSEMBLIES

VARIABLE DELIVERY PUMPS

FLUID MOTORS

VOLUME CONTROLS

DIRECTIONAL CONTROLS

PRESSURE CONTROLS

PERSONALS

J. K. GANNETT, director of engineering, The Austin Co.

• **J. K. Gannett,** vice-president of The Austin Co., Cleveland, and its eastern district manager since 1928, has been appointed director of engineering. He joined the company as assistant chief engineer in 1915, was named New York district sales manager in 1919, and later became vice-president and district manager. **Albert S. Low,** vice-president in charge of the Washington office, and **A. F. Plant,** vice-president and Detroit district manager, have been appointed directors of the company.

• **William S. Saylor** has been appointed assistant manager of sales, New York district of Carnegie-Illinois Steel Corp., a U. S. Steel subsidiary. His former position of manager of sales, Boston district, will be filled by **William G. Crook.** In turn, **James J. Henderson** succeeds Mr. Crook as manager of sales of the Buffalo district.

• **Ralph B. Kraft,** formerly manager of roll sales, Lewis Foundry & Machine division, Blaw-Knox Co., Pittsburgh, has been appointed vice-president in charge of all sales for that division. He was previously associated with Sherwin-Williams Paint Co. and the Cleveland-Cliffs Iron Co. **F. E. Walling,** assistant to the president, was appointed vice-president in charge of operations.

• **L. A. Bedard,** formerly associated with Mt. Vernon Car Mfg. Co., has been appointed sales agent for American Car & Foundry Co., New York, with headquarters at the company's St. Louis office.

• **Edward V. Creagh** has been appointed advertising and sales promotion manager of American Chain & Cable Co., Inc., and associate companies, Bridgeport, Conn.

• **Len D. Jenkins** has been appointed sales manager of the Northwest district and **R. L. Eddy,** assistant to the manager of sales, Pacific division, of American Can Co., New York.

• **Ernest Schleusener** has been elected vice-president in charge of operations for Oliver Iron & Steel Corp., Pittsburgh. **John P. Roche** was elected secretary and assistant to the president. Mr. Schleusener has served in various executive capacities in the plant.

• **R. T. Dunlap** and **E. F. Early** were elected vice-presidents of the Wickwire Spencer Steel Co., New York. Mr. Dunlap was previously assistant to the president. Prior to joining Wickwire Spencer, he was with the Vulcan Iron Works at Wilkes-Barre, Pa. Mr. Early has long been associated with the company as general superintendent at the Morgan plant in Worcester, Mass. **Harry E. Roulfs** has been appointed labor relations manager of the company with headquarters in Buffalo.

• **Frederick W. McIntyre, Sr.,** formerly vice-president and general manager of Reed-Prentice Corp., Worcester, Mass., has been elected president and **Ralph E. Thompson,** formerly president, was made board chairman of the corporation. **Charles S. Payson** was elected treasurer and **Frederick W. McIntyre, Jr.,** assistant to the president.

• **Mead W. Batchelor,** works manager of the mill division, has been named a vice-president of the Bridgeport Brass Co., Bridgeport, Conn. **A. Dean Merwin,** sales manager of the fabricating division, was made assistant secretary. Mr. Batchelor came to the company in 1933, was named works manager of the mill division in 1942 and later plant manager at Indianapolis. Mr. Merwin has been with the company since 1900.

• **Dr. Winfred L. Norem** and **John L. Ballard** have joined the Cardox Corp., Chicago, as chemical engineers.

L. G. SINGER, assistant secretary and treasurer, American Society of Tool Engineers.

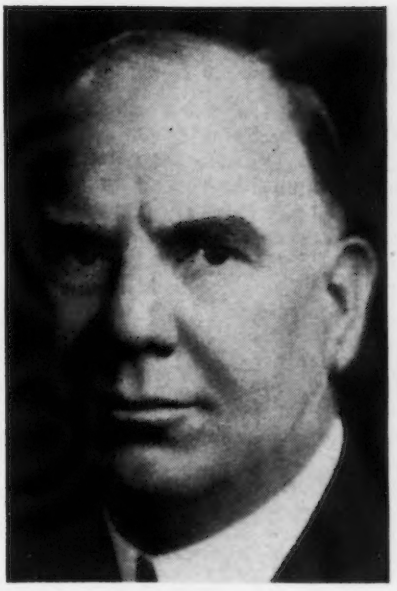
• **L. G. Singer,** district manager of Williams & Wilson, Ltd., Toronto, and director for the four Canadian chapters of the American Society of Tool Engineers, has been elected assistant secretary and treasurer of the society, thus giving the thousand or more Canadian members representation on the board of directors. Other officers elected at the annual meeting of the A.S.T.E. are pictured in the April 6 issue of THE IRON AGE.

• **Ernest Kuehn** has been made manager, Pacific coast region, of the Electro-Motive division of General Motors, Detroit, with offices in San Francisco.

• **Kentner L. Wilson** has been named branch manager of the Detroit office of the Minneapolis-Honeywell Regulator Co., Minneapolis.

• **Lewis Welshans** has become associated with the research department of Diamond Alkali Co., Pittsburgh, with offices at Painesville, Ohio. He will supervise the department's activities involving magnesium oxide and magnesium derivatives.

• **John F. Robb** has been appointed manager of the Pittsburgh district of the Climax Molybdenum Co. Before joining the Climax Technical staff in 1935, Mr. Robb was connected successively with the Carpenter Steel Co., the Birdsboro Steel Foundry & Machine Co., the Pittsburgh Crucible Steel Co. and the Brighton Electric Steel Casting Co.



CHARLES J. HARDY, chairman of the board, and FREDEDICK A. STEVENSON, president, American Car & Foundry Co.

• **Charles J. Hardy**, president of American Car & Foundry Co., New York, is relinquishing part of his duties as the president to become chairman of the board, which office is charged with the direction and control of the policies, finances, and activities of the company. He will retain his various offices and directorates. **John E. Rovensky** has been elected chairman of the executive committee. **Frederick A. Stevenson** succeeds Mr. Hardy as the company's president. Mr. Stevenson, has been associated with the company for more than 40 years, holding the position of master mechanic, assistant general manager, assistant vice-president in charge of operations, vice-president and senior vice-president.

• **Ray C. Faught**, long associated with General Electric's Baltimore office as a sales engineer, has retired after 45 years of service with the company.

• **Joseph T. Meade** has been appointed personnel director of Mack Mfg. Corp., New York.

• **Dean D. Crandall**, director of research since 1927, has been elected vice-president in charge of research of the National Gypsum Co., Buffalo.

• **Heywood Fox** has been elected president of Spencer Lens Co., Buffalo, Scientific Instrument division of the American Optical Co. He has been assistant to the president for two years.

• **George A. Chapman** has been elected a director of the Automatic Sprinkler Co. of America, Youngstown, to succeed the late Alfred Fritzsche. Mr. Chapman has been associated with the company 23 years and is factory manager of the plant. **William F. Joyce**, formerly vice-president, has been appointed senior vice-president; **John J. Power, Jr.**, was elected vice-president; **J. A. Coakley, Jr.**, secretary and treasurer, and **Elmer V. Bauman**, assistant secretary.

OBITUARY...

• **Fred S. Doran**, 56, vice-president of Joseph T. Ryerson & Son, Inc., Chicago, died March 24. He joined the firm in 1905, and became assistant manager of the Chicago plant in 1920. In 1927 he was made manager at Cleveland, holding this position until 1942 when he was elected vice-president of the firm, returning to its Chicago offices.

• **John F. Dorney**, manager of the Boston plant of the Walworth Co., New York, died March 31.

• **Albert B. Williams**, consulting engineer of Stone & Webster Engineering Co., Boston, died recently. He was 59 years old.

• **James J. Zimmerman**, 54, development engineer of Follansbee Steel Corp., Pittsburgh, died March 11. He was identified with the Follansbee organization for about one year prior to his death.

• **James D. Ford** has been appointed credit manager of the Weirton Steel Co., Weirton, W. Va., to fill the vacancy created by the death of the late W. L. Horner.

• **Norman E. Garman** has been made technical engineer for the Chicago territory of The Cowles Detergent Co., Cleveland.

• **Benjamin Van Horn** has retired as manager, crane sales division, Harnischfeger Corp., Milwaukee, after a 47-year continuous association with the company. He became engaged in crane sales work in 1913, and rapidly rose to the position of sales manager.

• **Hubert G. Larson** has been appointed procurement director of the Republic Aviation Corp., of Farmingdale, N. Y. He was formerly associated with the General Motors Corp., as eastern investment manager and regional manager.

Leo J. Mason, general superintendent of the Ellwood City, Pa., plant of National Tube Co., has been named vice-president of Tubular Alloy Steel Corp., Gary, Ind., succeeding **E. N. Sanders**, who becomes operating vice-president of National Tube Co. Both firms are subsidiaries of United States Steel Corp.

• **Claude S. Speicher** has been appointed treasurer of the Somers Brass Co., New York. He resigned as secretary to become treasurer.

• **Charles L. Taylor**, 68, president and treasurer of the Taylor & Fenn Co., and president of the Collins Co., in Collinsville, Conn., died March 30. In addition to his work at these companies, Mr. Taylor at one time served as vice-president of the National Founders' Association and as secretary of the National Machine Builders' Association.

• **Frank B. Wilkinson**, 87, retired industrialist and founder of Logansport Machine Co., Inc., Logansport, Ind., died on March 23.

• **Kenneth W. Howard** died suddenly, March 29. For seven years he had been sales engineer at Giebel Machine Tool Co., New York.

• **James S. Nicoll**, vice-president of the Kelly O'Leary Steel Works, Chisago, died recently following an illness of several months.

• **Francis K. Kernan**, president since 1910 of the Bossert Co., Inc., Utica, N. Y., died March 11.

Fatigue Cracks . . .

BY A. H. DIX

Bouquet For Our Bread and Butter

• • • A favorite story of ours is about the man who sat impassively through an incredibly bad play while the rest of the audience hooted and catcalled. A neighbor asked him, "How can you sit quietly through anything as awful as this?" The man replied, "I came in on a pass, so it would be unsporting of me to jeer. But if it gets much worse I will buy a ticket and join you."

We find ourself in a completely opposite situation. We would like to split an enthusiastic glove over the superb quality of today's industrial advertising, but as your favorite family journal carries more of it than any other publication, our applause might seem no more genuine than Gabriel Heatter's cheers for Kreml.

We wish, therefore, that someone as frigidly impartial as a draft board chairman would compare the quality of the advertising in this issue with that of every second April issue, at five-year intervals, back to say 1900. *He would find that at some point in that period a phenomenon occurred. At the beginning the advertisements were a deadweight on the train of reader interest powered by the editorial locomotive.*

That was when the bookkeeper wrote the ads, or else the boss' son-in-law was put in charge of advertising, on the theory that he could hurt the business less there than in any other department.

Good advertisements were scarcer than straight hair in Harlem. Then the idea began to get around that it might pay to let the man who handled the advertising actually see the product and even talk to some users. It was also discovered about this time that the clever ads did not appeal to the industrial reader nearly so much as those that gave him an idea he could put to work.

From then on advertising began to generate its own reader interest, and now things have come to such a pass that we find this in *Advertising Age:*

> "The great trade journals are often read principally for their advertising," pontificates Richard H. Rovere.

"Often read principally" is something like a rubber micrometer—with a tolerance of plus or minus a couple of inches. But the statement is sound at base. The old favorite in reader interest surveys, "Do you read the advertising?" would sound ridiculous and presumptuous today.

We are glad we have such a high-powered brains department that we need not live in dread of the day someone switches things around and asks, "Do you read the editorial pages?"

Six-Syllable Jewel

• • • Until a few days ago we would have given odds that no one in America owned a more musical name than the WAC chief, Col. *Oveta Culp Hobby.* But now, thanks to Peirce Lewis, this family journal's highly vocal business ambassador for Michigan and some points south, we have a new favorite — the Children's Fund of Michigan's Dr. *Icie Macy Hoobler.*

Excuse For Hari Kari

> Perhaps you noticed this statement in a recent *Time* advertisement:
>
> ". . . causes crystallization of the spring at the point where . . ."
>
> I have the very definite impression that this expression was obsoleted many years ago. Should not someone's face be red?
>
> —*E. J. Tompkins, Central Steel & Wire Co., Chicago 80*

Crystallization, used in the sense of fatigue failure, is excusable in a lay publication like *Time,* but if it occurred here the user would have ample excuse for falling on his sword, for he would have 104,500 readers (19,000 copies x 5.5 readers per copy) crying "For shame!" and telling him:

> "Crystallization is the natural state of all metals and alloys when not molten. You meant '. . . causes the metal to solidify in a grain structure conducive to low resistance to repeated stress.' "

Military Influence

• • • Speaking of red faces, whoever threw in the extra comma in this item in the Lehigh Alumni Bulletin certainly earned one:

> GENERAL WORKS, manager of the York corporation, able John G. Bergdoll, '20, was honored at the annual meeting of the American Society of Refrigeration Engineers . . .

Dead Noble—Honorable Discharge

• • • Which leads us into a bit of army lore contributed by one who knows everything:

> Your bit of amber on the various estates has the usual fly in it. The three estates are nobility, clergy and—all the rest—commons, peasantry, or hoi polloi, as you will. In the days when this was a valid phrase, the Army *was* the nobility. The Army meant the officers; the enlisted men didn't even count as soldiers. They were merely the property of the nobles, the serfs brought along for sound effects and background.
>
> The real fighting was done by the nobility, and whenever a noble got knocked off, which wasn't too often, his men just walked off and went home. Royalty was not a separate estate, but merely part of the nobility.
>
> —*Deac, the Poor Man's Froissart*

Backward, Turn Backward . . .

• • • As our own contribution to the postwar products pot we suggest that someone re-invent an automobile headlight with a replaceable bulb. When a headlight burned out we used to pay a quarter for a new bulb. But now whenever our fancy '40 Dodge gets one-eyed we have to buy a whole new unit, lens and all—price $1.50. It seems wasteful to us.

Shudder For Taxpayers

• • • While we are griping, we would also like to complain about the habit some firms have of making long distance calls about trifling things. Just this week we had two calls from far distant points about matters of no more than postcard importance.

The "hang the expense" attitude is certain to soar in wartime, but purely as a postwar safeguard, smart industrial managers guard against it, lest in flush times their organizations acquire expensive habits that will wreck them in lean times.

Aptronym

> You might be interested in knowing that WAVE Viola M. Merchant now has, appropriately, a rating of storekeeper, second class.
>
> —*W. L. Maucher, G-E, Schenectady Works Laboratory*

Stoppers

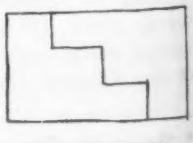
But are You running a physical-culture school?—*Robbins & Myers, Inc.*

A dunce cap for America?—*R. K. LeBlond Machine Tool Co.*

This Motor Pushes a "River"—*Westinghouse.*

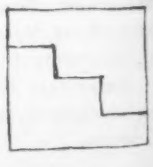
Puzzles

Last week's 9 ft. by 16 ft. plate should be cut into two pieces, as shown at the right, in order to form a 12 ft. by 12 ft. square.



If you solve this correctly within 12 seconds (no pencil or paper) you are uncommonly alert:

What is the difference between two flocks of twenty-one geese, each with a gander, and one flock of forty-two geese with two ganders?



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A complete "family" of single-stage, split-case pumps for low, moderate, medium, and high heads, is described in Bulletin 5810D. Many other bulletins available on other types.

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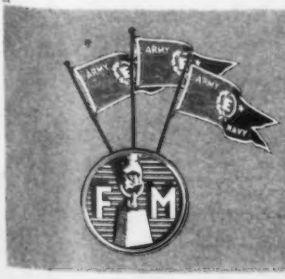
BUY WAR BONDS



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Pumps

Dear Editor:

SOLVENT DEGREASING

Sir:

May we make a few comments regarding the article on solvent degreasing in your Mar. 9 issue?

Where the author deals with the practical operation of a degreaser, the information is rather well presented. However, we believe there is too much introduction and "hearsay" discussion.

For an authoritative presentation of the physical and physiological properties of chlorinated solvents, it is suggested that the paper presented by E. W. McGovern at the 1943 meeting of the American Chemical Society be read.

Several corrections in the article as you printed it might be brought out. The vapor of trichlorethylene *is not* "five and one-half times heavier than air" (which means literally six and one-half times as heavy as air), but actually the vapor density is 4.54 as compared with air having a value of 1. Even with perchlorethylene, which represents only 5 to 10 per cent of the chlorinated solvent used for degreasing purposes, the vapor density is 5.83.

Contrary to the statement made in the middle of page 62, the government *has not* issued any order which "forbids the companies manufacturing any more (degreasers) at present."

What possible basis could the author have for his statements about Negroes, and that vapors combine with nicotine to produce "a third acid?"

Other questionable items are: "Solvent saved *will* (?) titrate higher than the original solvent;" "Some men's hands are so *oily* that a piece of steel they touch will be *rusty* the next day"; "Six weeks' hospitalization which *may* (?) have been caused by contacts with solvents"; and "His hands are *burned* (?) with it."

G. W. WALTER,
Adv. & Sales Promotion Mgr.
Detrex Corp.,
Detroit 27

● We hope to present next week the comments of the author, Herbert H. Hines.—Ed.

ROUTING FORMS

Sir:

On the printed routing forms you furnish free of charge to subscribers we suggest that instead of the words "Check here" in the left hand column you put the word "Date passed on." We suggest you also add this explanation to the slip, "After reading, put in left hand column opposite your name the date you passed this on to the next man." In this way we would have some record of how long it takes each man to go through the magazine and also a record of how much attention is given to it by each man.

F. L. FREUDEMAN,
President
Steele's Wire Springs, Ltd.,
Guelph, Ont., Canada

● This excellent suggestion will be adopted as soon as our stock of the present form is exhausted.—Ed.

CHARCOAL PIG IRON

Sir:

Will you please let us know who is now producing charcoal pig iron?

H. C. KETCHUM,
Purchasing Agent
American Rock Wool Corp.,
Wabash, Ind.

● Present producers are Newberry Lumber & Chemical Co., Newberry, Mich., and Tennessee Products Corp., Lyle, Tenn. Two furnaces ceased operating last year, the Delta Chemical and Iron stack at Wells, Mich., which is being moved to Texas, and the Antrim Iron Co., Mancelona, Mich., which we understand has been sold to a second hand dealer at Detroit, probably for dismantling. —Ed.

CONTINUOUS CASTING

Sir:

I would appreciate a reprint of the extensive article on direct casting in your Feb. 24 issue.

HAROLD J. RUTTENBERG,
Research Director
United Steelworkers of America,
1500 Commonwealth Bldg.,
Pittsburgh, Pa.

SHEET MIKE

Sir:

We have an application in our sheet mill in which it is necessary to ascertain the thickness of probably several hundred thousand sheets of steel during the course of a year by micrometer. It is necessary to mike each sheet in at least two places and sometimes in as many as eight. This is a slow and costly procedure. These sheets measure from .015 to .250 in., the majority being between .060 and .134. We are endeavoring to find a means of determining the thickness of these sheets through some type of ray or similar principle. Is there such a method?

G. W. RICHES,
Assistant Purchasing Agent
Newport Rolling Mill Co.,
Newport, Ky.

● Not that we know of. There seems to be no substitute for a micrometer in cases where the measuring instrument must be carried to the work. Special micrometers are on the market. L. S. Starrett Co., Athol, Mass., for example, has a dial sheet gage, No. 170, which is adapted for gaging sheets of miscellaneous widths, lengths and thicknesses.—Ed.

RIVETING HAMMER SIZES

Sir:

I have been informed that THE IRON AGE has technical data regarding the comparison of riveting hammers in size vs. various sizes of bucking bars for aircraft riveted structures.

E. W. BERGER,
Chief, Manufacturing Research
Consolidated Vultee Aircraft Corp.,
San Diego, Cal.

● Not us, and we have no recollection of any other technical journal publishing this information.—Ed.

SILENT DOERS

Sir:

We would greatly appreciate 20 copies of Mr. Van Deventer's Mar. 23 editorial, "The Silent Doers." Bill us.

CARL L. CUE,
Manager, Miscel. Farm Supplies
United Co-Operatives, Inc.,
510 West Ely St.,
Alliance, Ohio

AUTOMATIC REVERSING DRILL

Sir:

In your Mar. 16 issue, page 78 you mention a new type of drilling machine that automatically reverses when chips pile around the drill flutes. We would appreciate further information.

BUYER
Western Electric Co.,
Hawthorne Station,
Chicago 23

● See page 66.—Ed.

EDGES FOR ROUGH CUTS

Sir:

Will you kindly send me clippings of the article, "Are Sharp Cutting Edges Necessary on Rough Cuts?" by Leo J. St. Clair, page 55 of your Feb. 11, 1943 issue?

A. D. FORBES,
Expense Tool Div.
General Electric Co.,
River Works,
920 Western Ave.,
West Lynn 3, Mass.

PLASTALLOY

Sir:

Who makes Plastalloy, the material mentioned in the article on page 65 of your Nov. 4 issue, entitled, "Sealing Tube Ends With Plastic."

H. C. BLENKHORN,
General Manager
English Electric Co. of Canada, Ltd.,
St. Catharines, Ont.

● Plastalloy Co., Burbank, Calif.—Ed.

FOOLPROOF GAGING

Sir:

Your Sept. 3, 1942 issue had an article on "Foolproof Gaging System." Are copies still available?

PAUL R. KING,
Captain, C.W.S.
War Department,
Army Service Forces,
Office Chief Chemical Warfare Service,
Edgewood Arsenal, Md.

● Reprints were made and one is being sent you.—Ed.

THERMAC GRINDER

Sir:

Who makes the Thermac grinder?

FRED FERBER
Ferber Manufacturing Co.,
37 Nordhoff Place,
Englewood, N. J.

● McGonegal Mfg. Co., 899 Railroad Ave., East Rutherford, N. J.—Ed.

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usually cost less at the point of assembly

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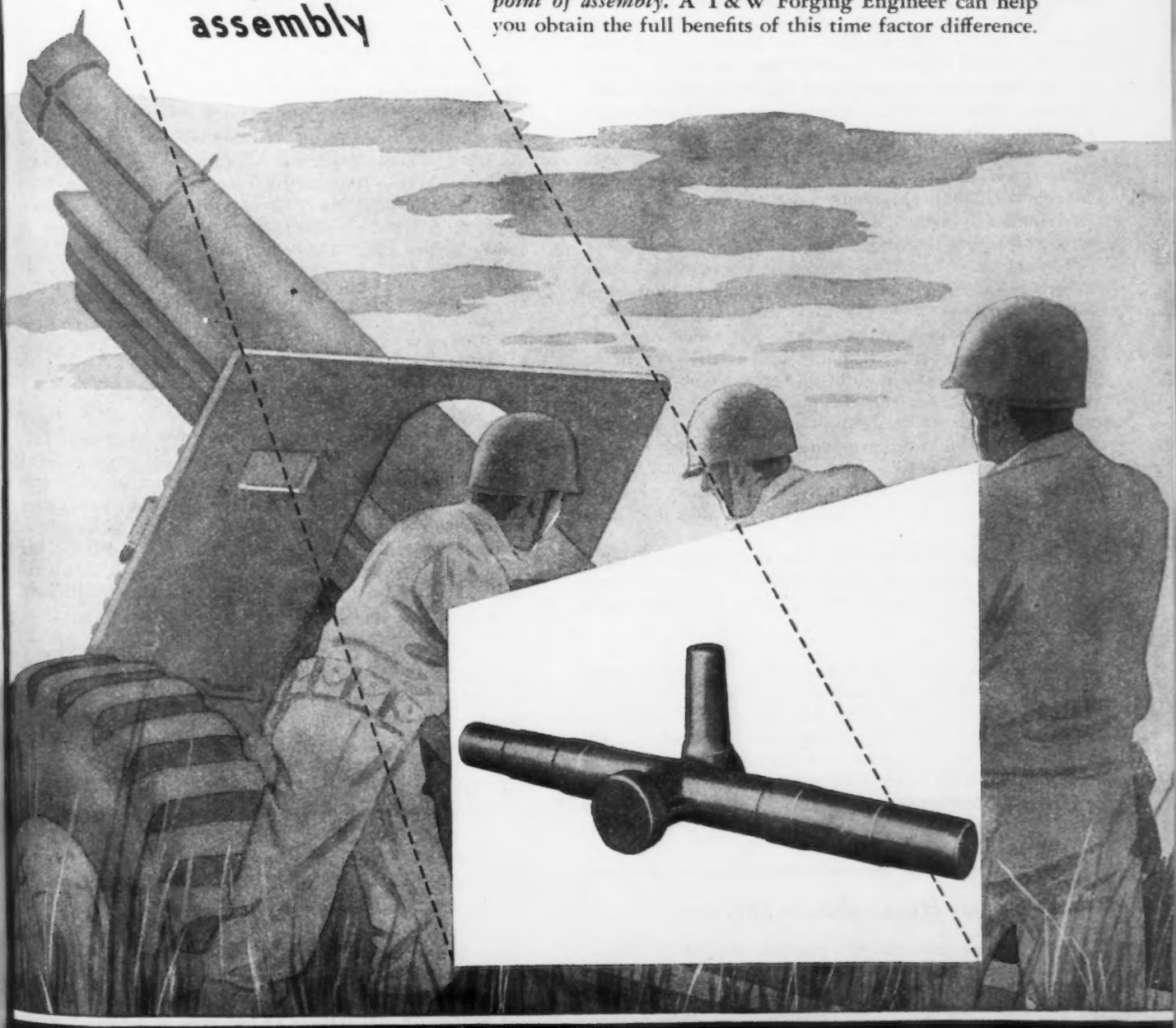

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SALES OFFICES: NEW YORK, PHILADELPHIA, CHICAGO, INDIANAPOLIS, DETROIT AND CLEVELAND

This Industrial Week . . .

- ***Rising Pressure for Production of Shell Steel and Plates Noted***
- ***Special Directive Treatment Arranged for Heavy Artillery Program***
- ***Net Sales of Steel Industry Up in 1943 but Profits Decline***

INCREASED pressure for steel all along the line from military agencies indicates that the high level activity of the steel industry will show little slackening this month. The demand for plates has become so heavy that it surpasses anything of its type since the war began. Ammunition, lend-lease, and many other requirements seem to be mounting.

First quarter ingot production set an all-time peak at 22,588,388 net tons and March output came within 14,357 tons of equaling last October's record. U. S. Steel Corp. shipments of finished steel at 1,874,795 net tons established a new mark in March and a new quarterly record also was achieved. Exceeding the previous record by approximately 50,000 tons, steel plate producers established a new high output in March with total shipments of 1,226,606 net tons. A new quarterly record in plate output was also made with shipments totaling about 3,519,000 tons.

This week's national steel ingot operating rate is estimated at 97 per cent of rated capacity, down half a point from last week's rate.

Mill overloads, particularly in flat rolled products, are reported resulting in many broken delivery promises and are making it difficult for railroad car builders to come anywhere near maintaining their schedules. Much emphasis centers upon demand for steel bars, where the manpower shortage is reported hampering production to a considerable extent. The jam in the semi-finished steel market, previously reported growing tighter, has been intensified by new lend-lease requirements.

One large steel producer in the Chicago area is still able to quote the same delivery dates as were available March 5 on the entire list of products, however.

FOR weeks steel producers have noted rising pressure for greater production of large shells for the Army and Navy. The trend was explained in part officially late last week by an announcement which said that for the next three months the special treatment now being given to landing craft will be made available to the most critical portion of the heavy artillery program, especially the cannon, ammunition, and prime movers for the 155 mm. gun, the 8-in. howitzer, the 8-in. gun and the new 240 mm. howitzer which has proved so successful in its initial tests. If delays occur, special directive treatment will be made available.

Meanwhile, WPB took two steps with respect to reconversion last week, one forward, the other backward. WPB Chairman Donald M. Nelson appointed a policy committee on reconversion made up of Robert Gaylord, president of the National Association of Manufacturers; Eric Johnston, president of the United States Chamber of Commerce; Eugene Meyer, publisher of the Washington Post; Philip Murray, president of CIO; and William Green, president of AFL. The committee was set up as a counter-irritant to restrictive influences on reconversion within WPB and the War and Navy Departments, and to suggest changes in war production policies which must be made before civilian production can be started on a greater scale.

The backward step was staff Memorandum No. 42 issued by the director of Industry Operations, Lemuel R. Boulware, covering labor area restrictions applicable to approved programs and resumed or increased production of non-military items.

The memorandum was addressed to all WPB bureau and division directors and would prohibit in group I labor areas the authorization of production of civilian items at a greater rate than that prevailing in the first quarter. It also restricts civilian production similarly in group II labor areas except in unusual circumstances. OCR officials and other top WPB officials are opposed to the order because they see it as an unnecessarily inflexible rule which will lead to all sorts of maladjustments in efforts to reconvert.

FULFILLING a promise made several months ago to the leaders of organized labor, Nelson may soon establish co-ordinate Labor Advisory Committees for each Industry Advisory Committee serving WPB. They will have authority to make recommendations with respect to labor utilization, the draft, production and reconversion.

New strikes have interfered with steel production. A three-day walkout which made 5600 workers idle at an Allegheny-Ludlum Steel Corp. plant. A one-day dispute resulted in the loss of 2200 tons of finished steel products at the Edgar Thompson plant of Carnegie-Illinois Steel Corp. Other unauthorized USWA walkouts included one that closed a sheet mill of Tennessee Coal, Iron & Railroad Co. for two days. In the last half year 500 strikes of one size or another, most of them "flash" disturbances of short length, have hit the steel industry. The total steel loss has been heavy.

The first vessel load of Lake Superior iron ore of the season reached Cleveland at 5 A.M., April 11 on the Steamer *Colonel* of the Cleveland-Cliffs fleet. The

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Sidelights of This Week's Market Summary

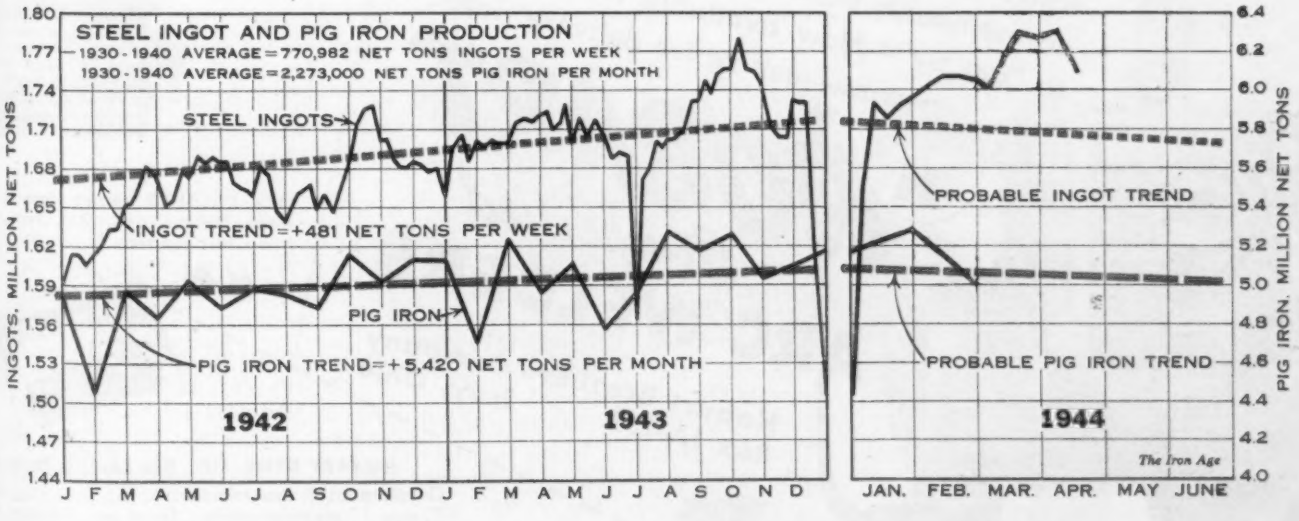
• • • Only one-third of the material in the hands of stampers when contracts are cancelled or terminated can be used at full value, it was estimated by the Pressed Metals Advisory Committee recently . . . One wire company is busy with a heavy, close wound spring formed from square wire which makes the case for several sizes of fragmentation bombs . . . The number of cold finished bar sizes has been reduced from about 1250 to about 450 and a reduction in the number of sizes of hot-rolled flats is now being aimed at . . . While the new Mexican mill under the supervision of the Armco International Corp., is not yet ready for operation the blast furnace should be blown in shortly . . . United Engineering & Foundry Co. has received a $12,000,000 order for blooming mill, structural mill, and other equipment from Russia according to unofficial reports at New York . . . There is talk of setting up a steel plant in Medellin, Colombia with furnaces, sheet rolling mills, and fabrication facilities . . . Truscon Steel Co., at Youngstown has received a multi-million dollar contract for rebuilding military vehicles. These are not battlefield returns but worn camp equipment. Work is to be done in the department which formerly made tank treads . . . Republic's sponge iron plant is due for a formal opening about May 1 to 15 . . . Civilian goods inquiries are still active. One mill has been queried about bars to make wringer roll centers . . . Details of the rocket program are a mute subject but the tonnage involved will be a shot in the arm for alloy producers . . . The new steel ammunition containers are not much heavier than the fiber boxes originally used with their metal ends and repackaging in wood.

vessel carried slightly more than 6000 tons of ore and was loaded at Escanaba on April 8. Another ship, the *Mudge* of the Hanna Line, also loaded at Escanaba on the same day, was due in later than April 11. About 175 freighters have sailed up the lakes so far.

NET earnings of the bulk of the steel industry were about $180,686,000 in 1943 against $196,370,000 earned in 1942. Net sales and operating income last year rose to $6,409,174,000 from $5,682,783,000 in 1942. The return on proprietary investment for 1943 was 5.17 per cent against 5.69 per cent for 1942. Steel companies producing carbon steel preponderantly showed a sag of 7.99 per cent in net profit for 1943 compared to 1942.

WPB's manganese piling policy has been termed inadequate by J. Carson Adkerson, president of the American Manganese Producers Association. He said, "During peace times, a year's supply of this ore was considered a normal backlog. Today in the midst of a global war we are told that 13 months' supply is sufficient, despite the fact that some of the largest producing areas are over 4000 miles distant across oceans." Apparently Adkerson based his statement on the uncertainty of continuing uninterrupted imports because of shipping and other conditions.

Results yielded by the two-week exhibit of surplus materials held at New York by five eastern aircraft companies and the WPB were reported to be comparable to the nationwide effort by the Materials Redistribution Division of the Army Air Forces over a much longer period, from last Sept. 1. The aircraft firms appear to have hit upon an idea that might well be applied in other fields over the nation. Meanwhile, certain officials of the Aircraft Scheduling Unit are advocating that some federal agency such as RFC be given the right to assume title to all materials and supplies declared surplus by the individual aircraft contractors, with the job of redistribution, salvage, and disposal delegated to the ASU.



Steel Ingot Production by Districts and Per Cent of Capacity

Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
April 6	96.0	101.5	98.0	91.0	95.0	104.5	93.5	99.0	100.5	90.5	83.0	93.0	93.5	97.5
April 13	95.5	100.5	98.0	93.0	96.5	104.5	93.5	99.0	100.5	90.5	96.0	93.0	98.0	97.0

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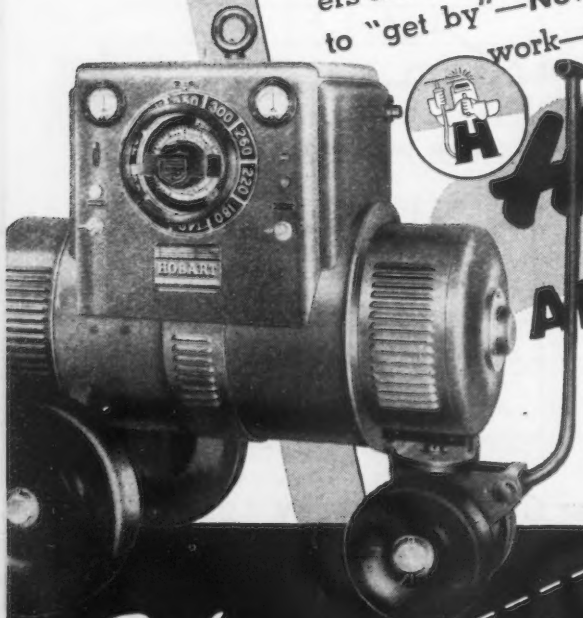

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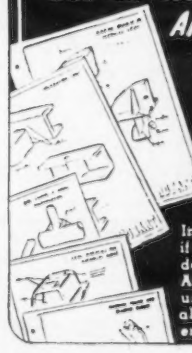

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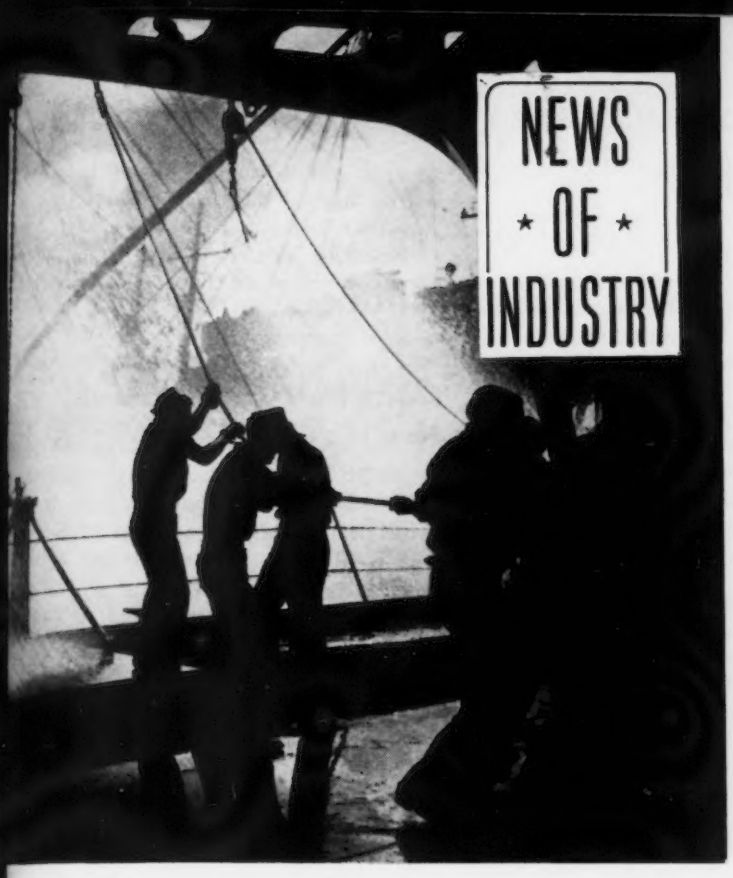

REFUELING: *U. S. Navy sailors secure lines as supply ship draws alongside in heavy sea.*

President's Stabilization Report Chills Hopes of Labor Chiefs but Some Rises May Materialize

o o o

By DONALD BROWNE
Washington Staff

o o o

• • • **By endorsing** a report from four of the Administration's high economic command to the effect that the stabilization "line" is being held and which also said that the cost of living is actually lower today than it was a year ago, the President on April 7 chilled the hopes of labor leaders seeking to raise the wage ceiling of the "Little Steel" formula.

The President said the report prepared by Economic Stabilizer Vinson, OPA Administrator Chester Bowles, WLB Chairman William H. Davis and Marvin Jones, War Food Administrator, which urged that present wage and price policies continue unchanged was worth stressing and of real importance.

However, observers here do not place too much reliance on the inference that the President will not permit AFL President William Green and CIO President Philip Murray to have new wage increases. Many things can happen between now and the time the CIO demands are settled by WLB, and these observers point out that the new report is based upon the Bureau of Labor Statistics cost of living figure which admits an 8 per cent increase in living costs since July, 1942.

The report asserted that wages have been stabilized and that basic factory wage rates have been raised less than 1½ per cent a month by WLB.

Senator Robert Taft, Republican, of Ohio, took sharp issue with this conclusion, saying that wages have risen more than 5 per cent a month during the last year, if all wage adjustments are considered. The report acknowledged that "take home" earnings had increased, but attributed this rise to factors "such as longer work hours, higher paying war jobs and incentives to produce."

Several other members of Congress regarded the endorsement of the report as a further attempt to throw the whole wage question into the lap of Congress, but leading Senators have said that they do not believe Congress will disurb Mr. Roosevelt's responsibility in this respect.

The consensus of industry here is that if WLB denies part of the CIO's 17c. an hour demand, other demands will be more hospitably treated. Whatever the final decision is, it is being predicted by informed sources that the Administration will make the claim that the "Little Steel" formula has not been breached because it merely tied wages to the cost of living and did not rigidly adopt the 15 per cent.

In addition to reinforcing Administration "efforts" to hold wages down, the action also was believed aimed at giving moral support to Capitol New Dealers for the impending fight over extension of the Price Control Act.

The report said:

"We must not jeopardize these gains by any change of policy or relaxation of effort in the critical months ahead.

"The need for continued restraint and continued cooperation with every phase of the stabilization program is evident. Obviously, too, we should cling to the policies and machinery which have served us so effectively thus far."

"Could this be interpreted as an answer to attempts to shatter the Little Steel formula?" Mr. Roosevelt was asked.

It doesn't answer anything; it's a statement of fact, he replied.

When he came to the statement that there has been no change of consequence in the cost of living for the past year, he remarked that he knew a lot of people would call that nonsense. The trouble is, he added, that the figure is made up nationally.

"This record—one year of stable living costs is unprecedented in this war or in the last war," the report said, and the President added: Or any other war in history.

"The stronger stabilization measures now in effect have succeeded because they have had the support of the American people," the report went on. "Throughout this period to be sure, voices have been raised against one part or another of the program and even against the entire policy. These voices have become fewer and have been heard less frequently. Today on the first anniversary, the 'hold-the-line' policy stands approved by the American people."

Campaign Opens in Michigan Against Labor Black Marketing

Detroit

• • • **A full-scale drive** against labor black marketing engaged in by illegitimate engineering companies was announced last weekend by Edward L. Cushman, War Manpower Commission director for Michigan.

Mr. Cushman said details on one firm's activities had been sent to Cleveland, regional WMC headquarters, for prosecution, and that some 50 other companies have been under investigation. The company at the head of the prosecution line was not revealed, but was said to maintain only a small office in Detroit, to do no actual engineering work, and to have netted about $250,000 annually.

Persons familiar with these particular operations said that the procedure is similar in virtually all companies masquerading as engineering firms—and in some which actually do engineering work. These companies find it easier than production companies to hire skilled men, for they operate under higher pay scales. Further, they can ship such men out of town and pay them $6 per day for maintenance in addition to their wages.

While this is legitimate for bona-fide engineering firms, it is a violation of wage ceilings when—as has happened, according to Mr. Cushman, on an occasional or regular basis in 100 of the 150 engineering firms in Detroit—such men do not do work for their employer while out on a job, but instead are simply transferred to the supervision and the production operations of the company contracting for the "engineering" service.

Many of the largest war producers in the country have engineering contracts which have been used to provide them with manpower in bottleneck capacities, it was said here. It was considered doubtful that these contractors would be prosecuted along with the engineering firms.

Prosecution can become extremely unpleasant not only for the pseudo engineering companies, but for war contractors utilizing them illegimately, it was believed.

Fines against engineering firm violators could be assessed at $1,000 plus a year's imprisonment for each worker hired and transferred in violation of the rules.

As for the companies which used such workers, the amount of wages paid in excess of wage ceilings could be deducted as an expense chargeable back against the government, and they could also be fined under possible fraud proceedings brought as result of the investigations by the Justice Department, independent of WMC.

Legitimate engineering companies, meanwhile, have been mulling over a code of ethics in conjunction with WMC and WLB which would separate the sheep from the lambs and tie up malefactors. This code would limit the number of workers which could be dispatched to out of town jobs by engineering companies, and would lay down specifications for their supervision. It would include definitions of engineering company job categories, thus limiting the work to qualified men rather than upgraded workers hired simply for "subletting" to machine jobs in scarce-help areas.

The legitimate interests who can be expected to favor adoption of a code of this sort have an interest in the matter beyond the legal side. Realizing that Detroit is the engineering consultation center of the country, they want to keep it so.

March Plate Output Hits New High of 1,226,606 Tons

Washington

• • • **Steel plate** producers established a new high output in March with total shipments of 1,226,606 net tons, according to a preliminary report released by WPB. This is an upward revision of 4021 tons over the first unofficial figure of 1,222,585 tons. A new quarterly record was also made with shipments totaling approximately 3,519,000 tons.

The March shipments compared with 1,174,414 tons in January, the previous record month, and 1,167,679 tons in March, 1943.

First Quarter Ingot Output at 22,588,388 Tons

Production of Open Hearth, Bessemer and Electric Steel Ingots, and Steel for Castings. Source: American Iron & Steel Institute

Based on Reports by Companies which in 1942 made 98.3% of the Open Hearth, 100% of the Bessemer and 87.6% of the Electric Ingot and Steel for Castings Production

Period	Estimated production—all companies: Open Hearth Net tons	Open Hearth Percent of capacity	Bessemer Net tons	Bessemer Percent of capacity	Electric Net tons	Electric Percent of capacity	Total Net tons	Total Percent of capacity	Calculated weekly production all companies (Net tons)	Number of weeks in month
January	6,776,733	97.3	439,424	85.4	379,045	83.6	7,595,202	95.7	1,714,493	4.43
February	6,408,879	98.4	409,786	85.2	369,817	87.3	7,188,482	96.9	1,736,348	4.14
March	6,959,569	99.9	455,396	88.5	389,739	86.0	7,804,704	98.4	1,761,784	4.43
1st Quarter	20,145,181	98.5	1,304,606	86.4	1,138,601	85.6	22,588,388	97.0	1,737,568	13.00

1943

Period	Estimated production—all companies: Open Hearth Net tons	Open Hearth Percent of capacity	Bessemer Net tons	Bessemer Percent of capacity	Electric Net tons	Electric Percent of capacity	Total Net tons	Total Percent of capacity	Calculated weekly production all companies (Net tons)	Number of weeks in month
January	6,576,524	97.8	478,058	85.9	369,395	95.4	7,423,977	96.8	1,675,841	4.43
February	6,031,363	99.3	447,843	89.1	344,532	98.6	6,823,738	98.5	1,705,934	4.00
March	6,787,630	100.9	503,673	90.5	381,219	98.5	7,672,522	100.0	1,731,946	4.43
1st Quarter	19,395,517	99.3	1,429,574	88.4	1,095,146	97.5	21,920,237	98.4	1,704,529	12.86
April	6,510,563	99.9	481,810	89.4	382,532	102.1	7,374,905	99.3	1,719,092	4.29
May	6,669,436	99.1	483,024	86.8	398,057	102.9	7,550,517	98.4	1,704,406	4.43
June	6,202,640	95.2	453,599	84.1	384,645	102.6	7,040,884	94.8	1,641,232	4.29
2nd Quarter	19,382,639	98.1	1,418,433	86.7	1,165,234	102.5	21,966,306	97.5	1,688,417	13.01
1st 6 months	38,778,156	98.7	2,848,007	87.6	2,260,380	100.0	43,886,543	98.0	1,696,426	25.87
July	6,556,531	96.8	466,288	90.6	393,342	94.0	7,416,161	96.3	1,677,864	4.42
August	6,699,850	98.7	484,957	94.0	407,224	97.1	7,592,031	98.3	1,713,777	4.43
September	6,646,702	101.4	480,635	96.4	391,241	96.6	7,518,578	100.8	1,756,677	4.28
3rd Quarter	19,903,083	99.0	1,431,880	93.6	1,191,807	95.9	22,526,770	98.4	1,715,672	13.13
9 months	58,681,239	98.8	4,279,887	89.5	3,452,187	98.5	66,413,313	98.1	1,702,905	39.00
October	6,891,753	101.6	513,521	99.5	413,787	98.7	7,819,061	101.3	1,765,025	4.43
November	6,542,942	99.6	440,941	88.2	390,564	96.2	7,374,447	98.6	1,718,985	4.29
December	6,509,923	96.2	390,930	75.9	364,924	87.2	7,265,777	94.3	1,643,841	4.42
4th Quarter	19,944,618	99.1	1,345,392	87.9	1,169,275	94.0	22,459,285	98.1	1,709,230	13.14
2nd 6 Months	39,847,701	99.0	2,777,272	90.8	2,361,082	94.9	44,986,055	98.3	1,712,450	26.27
Total (year)	78,625,857	98.9	5,625,279	89.1	4,621,462	97.4	88,872,598	98.1	1,704,499	52.14

Note—The percentages of capacity operated in the first six months are calculated on weekly capacities of 1,518,621 net tons open hearth, 125,681 net tons Bessemer and 87,360 net tons electric ingots and steel for castings, total 1,731,662 net tons; based on annual capacities as of January 1, 1943, as follows: Open hearth, 79,180,880 net tons, Bessemer 6,553,000 net tons, electric 4,554,980 net tons. Beginning July 1, 1943, the percentages of capacity operated are calculated on weekly capacities of 1,531,789 net tons open hearth, 116,494 net tons Bessemer and 94,667 net tons electric ingots and steel for castings, total 1,742,950 net tons; based on annual capacities as follows: Open hearth 79,867,450 net tons, Bessemer 6,074,000 net tons, Electric 4,935,960 net tons.

Procedure for Surplus Steel Sales To American Republics Established

Washington

• • • **Specific** procedures governing the licensing of surplus steel products for export to American Republics have been issued by FEA. The same procedures apply to all of the affected countries, except that in the case of Argentina applications for licenses must be accompanied by the usual certificate of necessity.

Permission will be granted to export only surplus steel that is destined for prompt consumption in end uses furthering the economies of the foreign countries. FEA said that it will not permit shipments in volumes which will tend to flood markets or endanger the future trade in steel products. Furthermore, it will not permit shipments of materials unsuitable in quality or specifications to meet foreign buyers' needs.

Each application for an export license must be submitted in quadruplicate, accompanied by a duplicate copy or photostatic copy of the order from the foreign buyer and sufficient information (item 11 of FEA 119 and item 8 of FEA 166) to represent fairly the specifications and conditions of the material to be shipped. This description should be in terms of the specifications used in the price regulations of OPA. On sales of idle or excess inventory held by other than steel mills and distributors and on sales of such material by government agencies and departments, the maximum price which might be charged the exporter is determined by Maximum Price Regulation 204. In such cases the exporter should submit with his license application a statement from his supplier that the price charged did not exceed the maximum permitted under that regulation.

A **statement** is required showing separately for 1942 and 1943 the total quantity of steel mill products covered by export licenses issued by the applicant for export to the specific Latin American country—not to the particular consignee. If the applicant prefers this information may be submitted only once in the form of a letter addressed to the Metals and Minerals Division, Requirements and Supply Branch, FEA, Washington 25, D. C., where it will be held on file reference when applications are received. The licensee will not be permitted to obtain the material covered from a supplier other than the one named in the application without a specific FEA amendment.

Surplus materials as considered by this FEA procedure are:

1—Idle or excess inventories held by other than steel mills, warehouses or distributers. Applications for export licenses covering materials in this category must be accompanied by a release on WPB form 3320 issued by the WPB Materials Redistribution Branch of the regional office in which the materials are located, or by the WPB Surplus Inventory Branch, Steel Division, Washington 25, D. C.

2—Products to be made from off-heat or defective billets and old rails, and reject and excess steel held by steel producers, warehouses and distributers. An application for export license covering materials in this category need not be accompanied by a WPB release. If it is determined that the application for export license can be approved, FEA will authorize delivery of the materials by a special allotment under the CMP.

3—Distressed materials (materials produced for commercial export but not shipped because of government policies, shipping conditions, etc.), and used materials. Applications for export licenses for distressed or used materials will be considered upon merits and supporting evidence.

Rivermen Get 66c. per Day Increase

Washington

• • • **Claiming that** the two companies had not demonstrated that it was a violation of the Wage Stabilization program, the WLB has denied appeals by the Carnegie-Illinois Steel Corp., and the Jones & Laughlin Steel Corp. from an order directing a daily wage increase of 66c. per day for river boatmen. Industry members of the board dissented from the decision.

Approximately 250 workers employed by the companies to man boats carrying ore and finished steel on inland waterways are covered by the board's order. The men are represented by three unions: the National Organization of Masters, Mates and Pilots, AFL; the National Marine Engineers Beneficial Association, CIO, and the National Maritime Union, CIO.

WLB on Feb. 9, 1944, had modified an order of the third regional War Labor Board which had directed a 44c. per day wage adjustment. Both companies appealed to the board for reconsideration of the modification of the regional board order.

The union, in their appeal to the national board from the first order of the regional board, had alleged that the 5.5c. per hr. increase ordered by the board for the steel industry should apply to the rates of the river boatmen. The national board accepted their appeal on this basis and remanded the cases to the regional board for consideration in light of this factor. The regional board reaffirmed its original order and directed an increase of 44c. per day.

2-TON AIR DELIVERY: ***Two Whiting Corp. rotary shears, each weighing 2000 lb., were picked up at the company's plant in Illinois and delivered to Lockheed Aircraft Corp., at Burbank, Cal., overnight by the Army Air Forces. Within 24 hours of their completion, the shears were in operation at the Lockheed plant.***

Surpluses Exaggerated, Army Aide Asserts, Predicting Orderly Handling of Them

New York

• • • **Total stock** of surplus goods having a conceivable civilian use now in the hands of the War Department and its contractors, actually stand at less than $2,500,000,000, in contrast with previous estimates ranging between $5,000,000,000 and $50,000,000,000, in the opinion of Howard Bruce, deputy director of materiel, Army Service Forces.

The handling of surpluses and other prospects for industrial reconversion to peacetime operations indicate an orderly procedure with little handship on business, according to Mr. Bruce. This is in spite of the fact that plant values of manufacturing organizations have increased 20 billion dollars since prewar days. Mr. Bruce, who is also chairman of the board of Worthington Pump & Machinery Corp., gave his views at a meeting April 5 at the Commerce and Industry Association of New York.

Estimates on termination values and costs, he emphasized, generally are exaggerated, as well as the quantities of Army surplus materials. Four billion dollars of Army contracts have been terminated to date, he said, with the cost to the government only $112,000,000. This, he explained, is due to the fact that cutbacks in individual plants usually mean changes in specifications with new contracts taking the place of those cancelled. Although $12,000,000,000 in contracts have been cancelled by the War Department, he pointed out, replacement of orders, in many cases simultaneous with cancellations, will result in an even greater level of war production in 1944 than in 1943.

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Steel Surplus Set at 250,000 Tons

Washington

• • • **WPB reported** that idle and excess stocks of steel aggregating more than 250,000 tons are now listed with its regional offices. This is a drop of 108,000 tons under the 358,000 reported on Jan. 15.

Despite the excess stocks, WPB said, there are many steel products still in short supply and on which delivery promises are considerably extended. Persons unable to satisfy their requirements from mill and warehouse sources were told that they should make use of these surplus stocks. This steel may be purchased without being charged to allotment totals, with WPB regional office approval, in accordance with Priorities Regulation 13. It was pointed out that if the regional office with which application for steel is made does not have the required material, a cross-check of the other regional offices can be made so that all such inventories throughout the country can be made available if they meet the customer's requirements.

New Wire Mill at Worcester Inspected

Worcester

• • • **The new** South Works wire mill of the American Steel & Wire Co. here was thrown open to the trade press last week. The newest major addition to the nation's wire production facilities, it represents advanced designing for specialized production.

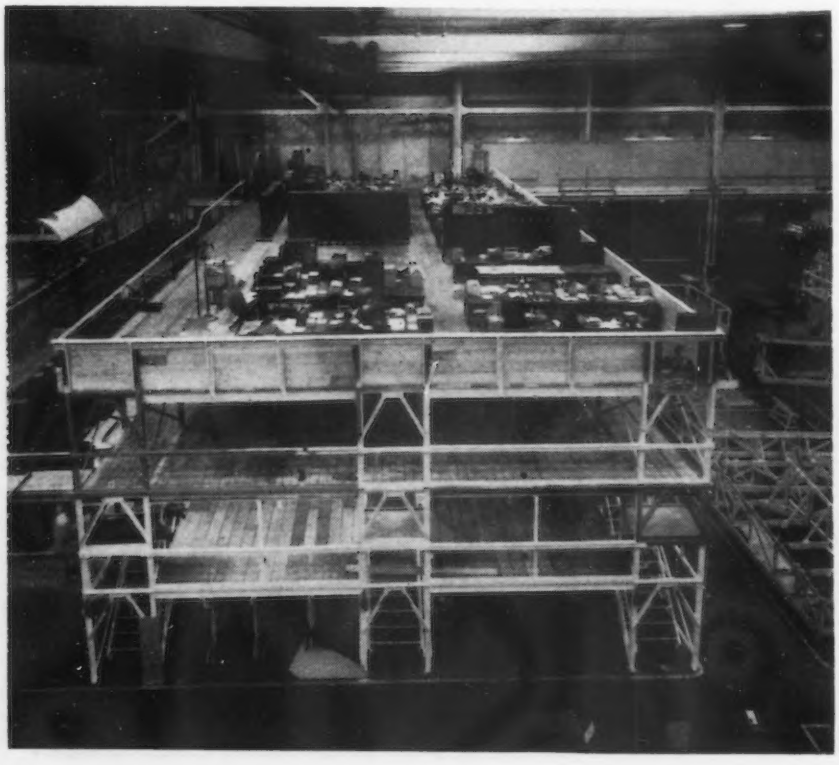
Under approximtely 14 acres of roof the newest equipment for the wire and cold rolled strip producers has been grouped to provide not only tonnage wire and strip production but also the broadest diversity of wire products in specialized small lots.

Long rows of high speed multiple draft blocks, continuous annealing, normalizing and tempering furnaces, both electro and hot dip galvanizing frames, electro and submersion plating equipment and similar highly modern equipment are in the plant. But a departure from older practice is elimination of the old wire mill buggy, supplanted with ram tractors for material handling. The work-order procedure travels the complete specifications of each order through every stage of processing.

A fair portion is given over to the cold rolled strip department. Exceedingly fine gage tolerances are being regularly met.

Since the plan has not yet been operating a full year with all equipment the annual production is estimated at about 125,000 tons of steel wire, 13,500 tons of cold rolled narrow strip, 15,000 tons of nails and 35,000 tons of galvanized products.

IMPROVISED OFFICE SPACE: *Here is one of two emergency office buildings at the Glenn L. Martin Co. plant which have been converted from PBM hull fixtures no longer needed because of improved assembly methods. Critical floor space shortages necessitated this emergency measure.*



Tubular Alloy's Comeback Celebrated at Formal Opening of New Gary Plant

Chicago

• • • **Nearly** 300 guests were invited to inspect the country's newest seamless alloy tubing production facilities last Wednesday at the formal opening of the Gary plant of Tubular Alloy Steel Corp., United States Steel Corp. subsidiary. Interest was shared between the equipment and the sweater girls operating it. Of the 3700 employees at the plant, 48 per cent are women.

Last week's opening typified the comeback for the plant built 20 years ago by National Tube Co. to produce butt weld and lap weld pipe. Although a seamless hot mill, pioneering in the technique of large size tube making, was added in the twenties, and a second seamless hot mill of the most modern design installed in 1930, the plant's capacity proved to be surplus in 1931. In 1942, Tubular Alloy converted the balance of the plant to large scale seamless alloy and stainless steel tubing production with particularly extensive cold drawing facilities. Tubular Alloy owns the site, the plant buildings and service facilities but all equipment and production machinery are owned by the DPC.

The large percentage of women employees partly results from such a large portion of the plant's functions being comprised of cold drawing and precision finishing operations. In all departments beyond the hot mill, operators are almost exclusively women. The company has made particularly good use of them as draw bench operators.

Charles R. Cox, president of Tubular Alloy and of National Tube Co., pointed out that tremendously increased demand has been felt in the past three to six months for seamless tubing for ammunition tubes, boiler tubes for ships, and bearings. He declared that approximately 300 different vital war items require seamless tubing, and that the plant currently is producing tubing for component parts for Army and Navy aircraft, for tank pins, tank pin bushings, and other military tank parts as well as for other military heavy duty motor requirements such as airplane truck and tank engine bearings. In addition, he said, the plant is making super-heater and condenser tubing for Navy and Maritime use in steam and diesel driven vessels and for the oil refining and rubber industries.

New Report Required from Companies Subject to 1943 Renegotiation Act

Washington

• • • **All contractors** subject to the 1943 Renegotiation Act must file a new standard report form with the proper agency, War Contract Price Adjustment Board or the Joint Price Adjustment Board, the War Department announced on April 6. Instructions accompany the forms.

The new forms must be filed on or before June 1, in the case of contractors whose fiscal year closes prior to March 1. For other contractors, the form must be filed on or before the first day of the fourth month following the close of the fiscal year. Failure to file the form draws a penalty under the statute of two years in prison or $10,000 fine or both.

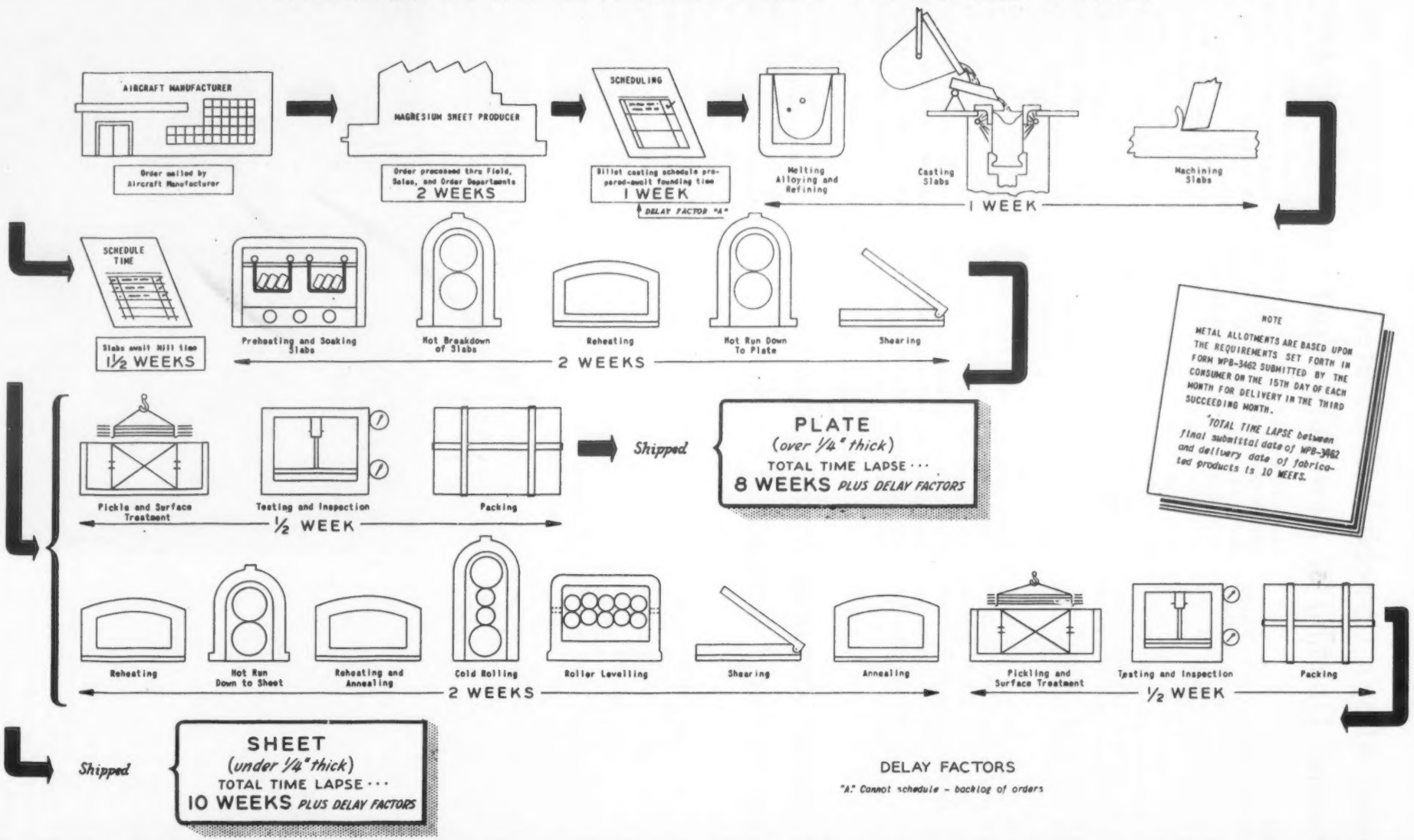
The forms are to be filed in duplicate. In the case of contractors assigned for renegotiation and receiving forms from a renegotiating agency, filing will be with that agency. Other contractors should file with the Assignment and Statistics Branch of the War Contracts Price Adjustment Board.

The forms will be distributed to contractors and suppliers renegotiated in 1943 by the renegotiation agency to which they have been assigned. Contractors may get copies from any of the renegotiation agencies, or from the Assignments and Statistics Branch, Renegotiation Division, Room 3D573, Pentagon, Washington 25, D. C., which will distribute them on behalf of the War Contracts Price Adjustment Board.

If all the information called for by the appropriate report form has been furnished by a contractor to one of the renegotiating agencies, the contractor may complete the form by incorporating by reference the information he has furnished and making a statement of the time and place of the prior filing. A report so prepared and filed will be considered as constituting a sufficient compliance with the mandatory filing requirements of the Renegotiation Act after certification by the appropriate renegotiating agency that the information supplied by reference is complete.

NEW TUBE PLANT: *Charles R. Cox, third from left, president of Tubular Alloy Steel Corp., and National Tube Co., subsidiaries of U. S. Steel, explains mechanical facilities used in alloy tube making at the Tubular Alloy plant in Gary, Ind., formally opened April 5.*

TIME CYCLE FOR PROCUREMENT OF AIRCRAFT MAGNESIUM ALLOY PLATE AND SHEET



THE Aircraft Scheduling Unit, at Wright Field, has issued a booklet containing about 15 time-flow charts for selected aircraft materials and components. The purpose of these is to speed ordering by contractors. Many of the charts, particularly those pertaining to steel, have been reproduced by this magazine in the past.

Magnesium's Role in War, and Future Possibilities Reviewed Before Chemists

• • • **How magnesium**, under the impetus of the war effort, has carved out for itself a front line role, was discussed last week by Leo B. Grant, sales manager of magnesium, Dow Chemical Co., at the American Chemical Society meeting in Cleveland. Here are quotes from his speech:

Every bomber and fighting plane which rolls off the assembly lines of this nation has on the average, at least half a ton of magnesium used in a wide variety of applications in the form of castings, extrusions, forgings and sheet all the way from the nose of the plane to its tail assembly.

In the engines most of the main housing castings are made of magnesium. Throughout the air frame there are literally hundreds of parts from rudder pedals to wing brackets which are made of magnesium. Practically every instrument is constructed partly of magnesium castings and extrusions. The main structures of machine gun turrets are made of magnesium sheets and castings. Practically every type of military aircraft, from the large four engine bombers to the small training planes, uses magnesium wheels. Magnesium is also being used now in the actual structure of the air frames and the new Douglas cargo planes use 6-in. magnesium I-beams for the floor construction. Recently, Douglas engineers reported that these beams were 5 per cent lighter, 25 per cent stronger and 35 per cent cheaper than anything they had used before. In some of the more advanced combat planes, magnesium is used for ailerons, trailing edge surfaces, interior duct work, panelling and doors. In planning for the fighting planes of the future, aeronautical engineers are planning on some models to use magnesium almost entirely throughout the constituent.

Only a few weeks ago the War Department, in selecting the metal to be used for its latest secret weapon, chose magnesium as the principal constituent.

Just recently was announced the use of 500 lb. "Goop" bomb. These incendiaries, which are also known as blockburners, are constructed to a large extent of powdered magnesium.

The plans, announced last year, to lighten Army equipment other than aircraft by the increased use of magnesium are well under way.

In all industrial operations where portability is an important consideration, magnesium offers advantages. Before the war we built large numbers of portable conveyors for use in railway express terminals. We found that the use of magnesium reduced the weight by over 50 per cent. To date, approximately 20 thousand feet of these conveyors have been installed in various terminals.

Magnesium can be spot welded, arc welded and gas welded. One recent development is helium arc welding which employs no welding flux and overcomes disadvantages encountered with other types of weld.

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Strikes Halt Steel Output

Pittsburgh

• • • **A three-day** walkout, which made 5600 workers idle at the Allegheny Ludlum Steel Corp., at Brackenridge, Pa., ended early this week. A heavy loss of war goods production was caused by the outlaw strike.

The walkout began following a dismissal by the company of four employees last week. This strike was one of 17 which have occurred at this plant since the first of the year.

According to H. G. Batcheller, president, the continual strikes have been "intolerable." He charged that the "latest walkout was fomented by a small minority in the CIO local union."

A one-day strike, which resulted in a loss of 2200 tons of finished steel products, ended early this week at the Edgar Thompson plant of Carnegie-Illinois Steel Corp. at Pittsburgh.

Early this week, 700 CIO steelworkers were on a strike at a drop forge plant of the Aluminum Co. of America at Canonsburg, Pa.

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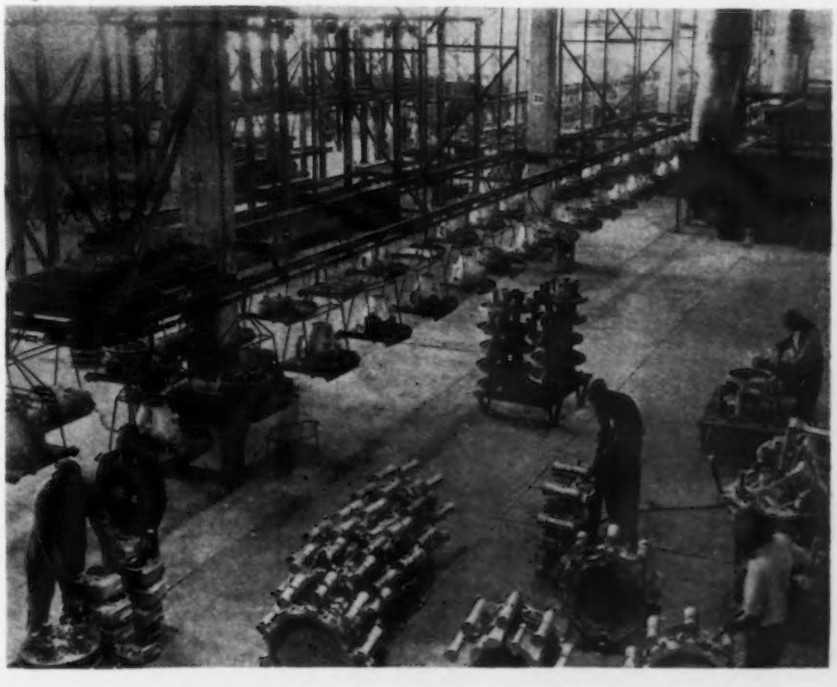
Birmingham

• • • **Unauthorized** strikes by members of the USWA-CIO and United Mine Workers of America shut down a sheet mill and a coal mine of the Tennessee Coal, Iron & Railroad Co. here last week.

The sheet mill closed down the afternoon of April 4 after a strike of cranemen who left their jobs in a demand for increased wages.

The Tennessee company's Wylam mine shut down April 5 after a negro trip rider had been suspended. Miners were begininng to return to work April 8.

CLEANING MAGNESIUM CASTINGS: *At the Dodge Chicago plant of Chrysler Corp. around 50,000 lb. is being melted in the magnesium foundry daily. Here rough castings are cleaned prior to machining. The plant is making 18 cylinder Wright 2200 h.p. engines.*



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Gains in Alloy Grades Will Feature Bar Distribution Pattern

Pittsburgh

• • • **The significant trend** in steel bar production, from the normal 1939 period to 1943, was the substantial increase in the production for sale of hot rolled alloy bars and cold drawn alloy bars. The production of hot rolled alloy, in 1943, represented an increase of 259 per cent over 1939, while cold drawn alloy production increased 578 per cent over 1939.

Equally as significant, was the change in the participation of these two products in terms of per cent of total bar output. In 1939, hot rolled alloy steel bars constituted 12 per cent of total bar production; and, in 1943, they had climbed to 21.8 per cent, of the total. Cold drawn alloy bars, which in 1939 represented about 1.1 per cent of total bar production, climber to 3.8 per cent of the total in 1943.

There has been speculation in the trade recently as to whether the favored position of alloy steel bars, because of war demand, will be retained fully in the postwar period. The consensus of most steel makers, who make and sell carbon and alloy steels, is that while alloy will not maintain the total gains it made during the war, it will, nevertheless, find wider and greater distribution than was the case in pre-war periods. Furthermore, it is believed that the competition between carbon steel bars and alloy steel bars will be quite substantial after the war has ended.

The under-surface, but, nevertheless, factual gossip, concerning residual alloys, will probably play an important part in the competitive picture, just as it is doing now. Nevertheless, makers of carbon steel bars, it has been learned, are expected to utilize all the lessons learned during the war period, to convince consumers that the exploitation of carbon steel bar products was not fully taken advantage of in the pre-war period. Undoubtedly, what they mean is even better quality control with ladle additions, involving intensifiers, such as boron, etc. That it will be a merry battle, is fully indicated by the substantial capacity which now exists for making alloy steel.

The age old product, classified as merchant bars, due to its versatility, did not give much ground when the war period superseded the peace era. In 1939, hot rolled merchant carbon bars constituted 54.8 per cent of the total bars produced for sale; and in 1943, they still accounted for 54 per cent of the total. This experience takes into account only those merchant bars sold as such, and does not include merchant bar production which was subsequently cold drawn. On a tonnage basis, hot rolled merchant carbon bars, in 1943, were produced at a rate 93 per cent greater than in 1939, almost on a par with the increase in the production of all bar products from 1939 to 1943.

Cold drawn carbon bars also benefited substantially in the way of production and participation, by wartime demands. In 1939, cold drawn carbon bars constituted 10.1 per cent of total bar production, but in 1943 had climbed to 15.4 per cent of aggregate bar output. Actual production of cold drawn carbon bars, in 1943, compared with 1939, showed an increase of 200 per cent.

The "Cinderella" in the bar picture, during the war period (and the upturn here will come in the post-war era, when construction regains its prominent position), was reinforcing concrete bar steel. While other types of bar products were showing substantial increases in production and participation, the output of reinforcing bars dropped like a plummet from 1942 to 1943. In 1939, new billet reinforcing bar output constituted 17.8 per cent of total bar production, in 1942 it was 14.7 per cent of the total, and in 1943 it dropped to 3.6 per cent. This phenomenal decline was a direct result of the stranglehold placed upon concrete bar output by the War Production Board, on the basis that other types of steel bars were far more essential to the war effort.

The actual tonnage decline of reinforcing new billet bars in 1943, compared to 1939, was 59 per cent. Reinforcing bars made from rail steel were about three per cent of total output of bars in 1939, and only .7 per cent in 1943. Rail steel reinforcing bars, likewise, declined, on a tonnage basis, from 1939 to 1943, to the tune

TRENDS IN STEEL BAR PRODUCTION FOR SALE

1939-1943 Net Tons (000 Omitted)

Source—Amer. Iron & Steel Inst. Compilations—The Iron Age

	BAR PRODUCTION							
	Hot Rolled		Cold Drawn		Reinforcing		Hoops and Bailing Bands	
YEAR	Merchant (Carbon)	Alloy	Carbon	Alloy	New Billet	Rail		Total
1939	3221	702	593	66	1039	175	72	5868
1940	4365	962	725	100	1299	142	100	7693
1941	5673	1621	1244	198	1639	253	111	10739
1942	5684	1849	1241	313	1612	233	99	11031
1943	6216	2518	1773	448	422	80	84	11541
Per Cent Increase 1943 Over 1939	+93	+259	+200	+578	−59	−54	+17	+96

BAR PRODUCTS OUTPUT IN PER CENT OF TOTAL BAR PRODUCTION

1939-1943

Source—Amer. Iron & Steel Inst. Compilation—The Iron Age

	PER CENT OF TOTAL OUTPUT						
	Hot Rolled		Cold Drawn		Reinforcing		Hoops and Bailing Bands
YEAR	Merchant (Carbon)	Alloy	Carbon	Alloy	New Billet	Rail	
1939	54.8	12.0	10.1	1.1	17.8	3.0	1.2
1940	57.0	12.4	9.3	1.3	17.0	1.7	1.3
1941	53.0	15.0	11.5	1.8	15.3	2.4	1.0
1942	51.6	16.7	11.3	2.7	14.7	2.1	0.9
1943	54.0	21. 8	15.4	3.8	3.6	0.7	0.7

of 54 per cent. Recently, there have been signs that the government has belatedly given concrete bar producers a new lease on life, and that hereafter restrictions on the use of concrete bars will probably be almost entirely eliminated.

Some designers, engineers and contractors, privately feel that the restriction on concrete bars, in the past few years, represented a "penny wise and pound foolish" policy. For proof of this, they point to such things as wooden hospital floors, tremendous concrete build-ups, which, in some cases have cracked due to lack of reinforcing, and the general lack of the common knowledge that at the time concrete bars were restricted, wood, which was a primary shortage item, was being utilized, to replace concrete bars. At any rate it is believed, on good authority, that this short-sighted policy will make itself visibly apparent for sometime to come.

Steel researchers, generally, are of the opinion that the bar distribution pattern, in the postwar era, will be substantially the same as before the war, with the exception of definitely retained gains in the alloy category. It is also expected by these experts that the resumption of civilian industries will find merchant bars in probably greater demand, proportionate to the total output of steel, than was the case in 1939. One important fact, known by many, but little publicized, is that the trend in steel bar production is probably a greater indicator of the country's prosperity that even the so called complex business indices. There is probably no single steel product which finds its way into more avenues of steel consumption than steel bars.

RISE IN SHIPMENTS OF ALUMINUM FABRICATED PRODUCTS SHOWN

Monthly Shipments, 1943 and January, 1944

Source: WPB (Millions of Pounds)

MONTH	Rod, Bar, Wire and Cable	Sheet, Strip, Plate and Foil	Rolled and Extruded Shapes	Castings	Forgings	Tubing	Rivets	Ingot, Powder and Paste	Total (All Shapes)
1942—Total	98.3	540.4	84.7	324.1	123.3	32.1	17.0	179.0	1398.9
1943—January	10.1	68.4	7.6	33.1	17.8	3.6	1.9	18.0	160.5
February	10.1	59.8	7.4	33.4	15.6	3.4	1.9	15.2	146.8
March	12.6	78.3	8.0	38.7	19.7	4.1	2.4	19.2	183.0
April	12.8	65.2	8.2	37.1	19.5	3.1	2.4	17.8	168.1
May	14.4	63.4	9.8	37.7	19.6	3.6	2.4	17.3	168.2
June	11.8	61.9	9.5	36.3	19.6	3.5	2.6	20.4	165.6
July	12.4	69.2	11.9	37.2	22.1	3.5	2.4	26.3	185.0
August	11.5	73.8	10.6	38.2	23.0	3.5	2.4	21.3	184.3
September	11.5	77.2	13.9	41.0	23.4	3.6	2.6	23.6	198.8
October	13.5	81.3	14.9	43.0	25.4	3.9	2.5	28.1	212.6
November	12.9	75.6	15.8	43.2	28.8	4.5	2.5	28.0	211.3
December	12.8	66.9	13.3	41.6	28.4	4.4	2.4	20.6	190.4
1943—Total	146.4	841.0	130.9	460.5	262.9	44.7	28.4	255.8	2170.6
1944—January	9.7	85.0	11.7	44.5	27.7	5.0	2.4	29.7	215.6

SHIPMENTS OF ALUMINUM CASTINGS CHARTED

Monthly Shipments by Type, 1943 and January, 1944

Source: WPB (Thousands of Pounds)
(1942 shipments by months appeared in the Jan. 27 issue, page 99)

MONTH	SAND CASTINGS				PERMANENT MOLD CASTINGS			DIE CASTINGS			TOTAL CASTINGS
	Heat-Treated		Non-Heat-Treated	Total	Heat-Treated	Non-Heat-Treated	Total	Cold Chamber	Goose Neck	Total	
	Cylinder Head	Other									
1942—Total	NA	150,125*	57,363	207,488	54,759	5,884	60,643	NA	NA	55,924	324,055
1943—January	8,875	9,032	3,968	21,875	5,808	598	6,406	4,036	767	4,803	33,084
February	9,039	8,918	4,082	22,039	5,950	566	6,516	3,944	880	4,824	33,379
March	10,974	9,997	4,338	25,309	7,268	680	7,948	4,519	958	5,477	38,735
April	9,963	9,973	4,360	24,296	6,919	667	7,586	4,301	882	5,183	37,065
May	10,422R	10,032R	4,524	24,979	6,988	679	7,667	4,157	887	5,044	37,690
June	9,710	9,544	4,825	24,079	6,244	642	6,886	4,367	965	5,332	36,297
July	10,372	9,737	4,563	24,672	6,411	710	7,121	4,635	728	5,363	37,156
August	10,393	10,202	4,781R	25,376	6,442	736	7,178	4,751	866	5,617	38,171
September	11,466	10,719	5,028	27,213	7,158	801	7,959	4,786	886	5,672	40,844
October	12,707	11,101	4,737	28,545	7,327	692	8,019	5,298	921	6,219	42,783
November	12,504	11,139	4,825	28,468	7,652	642	8,294	5,317	871	6,188	42,950
December	11,353	11,263	4,651	27,267	7,340	755	8,095	5,084	936	6,020	41,382
1943—Total	127,778	121,657	54,682	304,118	81,507	8,168	89,675	55,195	10,547	65,742	459,535
1944—January	12,441	11,874	5,090	29,405	7,431	930	8,361	5,579	804	6,383	44,149

*—Includes cylinder head castings.
NA—Not available
R—Revised.

Brokers Permitted to Pass CMP Materials to Sellers Under New Plan

Washington

• • • **A procedure** under which brokers and other intermediaries may pass on authorized controlled material orders from their customers to sellers of such materials has been provided in Direction No. 48 to CMP Regulation 1, WPB announced. The direction applies to sales of idle and excess inventories as well as to sales of newly fabricated controlled materials forms and shapes of copper, steel, and aluminum.

An intermediary who receives an authorized order for controlled materials may place orders for the same quantity of materials with a supplier, specifying delivery as directed by his customer. In placing such an order, the intermediary must furnish a copy of the endorsement which he received from his customer together with his own purchase order for the material. This endorsement must include the customer's name and his allotment number or symbol, or a copy of the specific permission for the purchase or sale of the material granted by WPB.

Purchase orders placed in this manner may be accepted by suppliers, but they are not compelled to do so. If the order is accepted, it shall have the same status as an order placed directly by the customer. If the supplier rejects such an order when he has materials or open space in his production schedule available to fill it, he must immediately notify the intermediary in writing that he is prepared to fill the order if it is 1—placed directly by the customer or 2—if it is placed by another person.

Intermediaries may not take title to materials during such transactions. However, if governing laws permit, the intermediary may pay the supplier for the materials and in turn bill his customer for them. These rules do not apply to producers of copper in controlled materials forms or to warehouses who purchase copper as intermediaries. Rules governing such producers and warehouses are contained in CMP Regulation No. 4 and in Direction 9 to CMP Regulation No. 1.

The new procedure does not permit intermediaries to establish warehouse stock of materials, and consequently will not interfere with steel warehousing operations. The direction has been issued to encourage agents to locate sources of controlled materials for their customers and to encourage such agents to combine small orders into mill run quantities.

Priority Changes

Automobiles—Meeting has been called of the Automotive Manufacturers Advisory Committee on April 17 and 18.

Construction—Distinction between residential and farm construction is made by pointing out that a property is not necessarily a "farm" because farm products are produced on it, but only if used primarily for farming. Int. 5 to L-41. (4-5-44)

Construction controls—Public housing, as well as private, has been placed under the control of a single order. P-55-c, as amended. (4-4-44)

Containers—To assure adequate cans for food pack WPB warns all packers of non-food items that they cannot exceed more than 25 per cent of their annual packing quotas during the second period. Dir. to M-81. (4-7-44)

Excess steel—Idle and excess stocks of steel now listed with WPB regional offices may be purchased by persons unable to fill their requirements from the usual mill and warehouse sources. PR 13. (4-4-44)

Farm machinery—Minor changes have been made to make item descriptions in the schedules for export of farm machinery and equipment to Canada conform with descriptions of the same items set up for domestic production and use. L-257-a, as amended and Sched. 18. (4-5-44)

Food processing machinery—Interpretation states that any manufacturer may apply, within classes of materials, various percentages of each type of material used. Int. 2 to L-292. (4-3-44)

Fountain pens—Individual quarterly production and delivery quotas have been assigned to 44 manufacturers of fountain pens and 32 manufacturers of mechanical pencils in plants at designated locations. L-227, as amended. (4-4-44)

Hand tools—Permitted volume of production of manually-operated wood and special purpose saws has been increased and restrictions on butcher saws have been removed from the schedule. Sched. III of L-157, as amended. (4-4-44)

Machine tools—Rules governing approval of preference ratings assigned on Form WPB-542 by WPB field offices for machine tools have been modified. WPB Directive 23.

Mines and smelters—A quarterly quota system for MRO materials for domestic mines and smelters based on the corresponding quarters of 1943 has been set up. P-56, as amended. (4-5-44)

NE specifications—NE specifications for reinforced concrete buildings have been amended to increase the amount of reinforcing steel that may be utilized, to exempt from their provisions small projects using less than five tons of steel, and to eliminate some of the paper work requirements for the construction industry. Dir. 8 and 9, as amended. (4-3-44)

Physical therapy equipment—Restrictions on the manufacture and sale of physical therapy equipment have been eased. L-259, as amended. (4-7-44)

Plumbing equipment—Delivery of certain fabricated metal pipes and certain boilers and boiler units which are produced for the plumbing and heating industry have been frozen for two months. Table 14 to M-293. (4-8-44)

Plumbing fittings—Limited production of copper ball cocks for plumbing fixtures permitted. Sched. V to L-42, as amended. (4-5-44)

Reclassifications—Carbon dioxide fire extinguishers that are mounted on wheels and use high-pressure hose are classified as Class X products. Cranes and monorail systems are classified as undesignated products under the schedule jurisdiction of the Tools Division. Tables 10 and 12 to M-293. (4-5-44)

Reflectors—Restrictions removed on the use of metal in reflectors of fluorescent lighting fixtures, and weight limitations on ferrous metal used in other parts of these fixtures are also removed. L-78 as amended. (4-3-44)

Safety switches—Restrictions have been lifted on the gage of steel which may be used by manufacturers in producing enclosing cases, fronts and doors for safety switches, panel boards and service entrance equipment. L-315, as amended. (4-3-44)

Shipbuilding—Tables covering items under jurisdiction of the Building Materials Division and the Shipbuilding Division have been revised to conform with the Feb. 10 issue of the general scheduling order. Table 5 and 11 under M-293. (4-6-44)

Sterilizers—Restrictions on the use of copper and copper base alloys in sterilizer equipment have been eased. L-266, as amended. (4-3-44)

Tire chains—The percentage of metals which a manufacturer may use in the production of tire chain for passenger autos has been raised from 16 to 24 per cent of the total weight of metals he used in the production of all tire chain sold by him during the base period from April 1, 1941, to March 31, 1942. L-201, as amended. (4-3-44)

Transfer of allocations—Amended regulation points out when allocations may be transferred. Reg. 7A, as amended. (4-3-44)

Transformers, electric—The installation of new electric connections, both urban and rural, has been curtailed. U-1-c, U-1-d, U-1-f and U-1-h. (4-6-44)

Wrenches—Restrictions on the production and distribution of specified types and sizes of wrenches have been relaxed. Sched. II to L-216, as amended. (4-5-44)

•

Redistribution Channels Set Up For Screw Machine Products

• • • **The Redistribution** Unit of the Bolt, Nut, Screw and Screw Machine Products Section of the Building Materials Division of WPB is analyzing the problem of redistribution of inactive and excess stocks of bolts, nuts, rivets, screws, and screw machine products.

Certain channels of redistribution are now operative and are available to the producers of bolts, nuts, screws and rivets, as well as all consumers and distributors, all within the permissions and restrictions set out in Priority Regulation No. 13, revised, Feb. 29, 1944.

The present plan of redistribution under Priority Regulation No. 13 is as follows: 1—Idle or excess stock not in regular trade channels, that is not in the industry producers' and/or distributors' hands, should be reported to the district or regional WPB office. 2—All companies (producers, consumers or distributors) should inquire of their district or regional office of WPB for such items as they need or may wish to purchase.

This channel of redistribution is now set up and functioning and large quantities are moving weekly out of idle and excess stocks. Assistance in the application of the present redistribution plan will be given either by A. M. Jones, section chief, or by inquiring at the nearest district or regional WPB office.

Wider Use of Metals for Civilian Products Approved by WPB Amendments

Washington

• • • **An examination** of the past week's orders issued by WPB in controlling the use and distribution of metal products finds that the numbers of civilian products are increasing slowly but steadily. Stainless steel for cutlery has again been made available under an amendment to L-140-a. The use of non-nickel stainless is permitted for such types of cutlery as were formerly made of this material within the restrictions as to the patterns manufacturers are now allowed to make. This supplements the order issued two weeks ago (THE IRON AGE, March 30, page 97) permitting chromium stainless for flatware manufacture for institutional users.

Restrictions were removed on the use of metal in reflectors of fluorescent lighting fixtures and weight limitations were lifted on ferrous metal used in other parts of these fixtures in an amended version of order L-78. Permitted use of aluminum in industrial type lighting equipment was established by amended order M-l-i, March 24.

Limitations on the use of ball bearings and other alloy steel products in swivel bearings and casters of two-wheeled hand trucks, platform trucks and dollies were lifted by an amendment to L-111. Another amendment to the order lifts restrictions on the use of cast steel for wheels and cast iron and steel for other parts in the manufacture of these items. An interpretation (No. 2) to the order specifically designates the types of carriers controlled by order L-111.

All restrictions as to gage of steel used in producing enclosing cases, fronts and doors for safety switches, panel boards and service entrance equipment were lifted by an amendment to L-315.

Greater size variety is permitted in the manufacture of certain enameled pans and containers under the amended L-30-b. Since iron and steel quotas were previously assigned on these items, no over-all production increase can result.

Permitted volume of production of manually operated wood and special purpose saws, covered by Schedule III of the hand tools simplification order L-157, was increased and restrictions on butcher saws were moved from the schedule.

Tire chain manufacturers for passenger autos may use 24 instead of 16 per cent of the total weight of metals used in production of all tire chains sold during the base period. This percentage is effective from April 1, 1944, to March 31, 1945. Increased production of farm tractor tire chains was also authorized. However, plants in Class I and II labor shortage areas may not use a greater tonnage for tire chain production than used last year except by special authorization.

o o o

Concrete Bar and Structural Orders Eased

Washington

• • • **National Emergency** Specifications for reinforced concrete buildings (WPB Directive 9) have been amended to increase the amount of reinforcing steel that may be utilized, to exempt from their provisions small projects using less than five tons of steel, and to eliminate some of the paper work requirements for the construction industry, the WPB Conservation Division announced on April 3.

A similar reduction in paper work requirements was made in Directive 8, governing structural steel for buildings, and Directive 29, governing stress grade lumber for buildings. Simultaneously, Directive 8 was amended to exempt from the specification provisions any project using less than 5 tons of steel. The amendments to the three directives became effective March 30.

In reinforced concrete construction, WPB Directive 9 is amended to permit the use of about five per cent more reinforcing steel, with a consequent reduction of about 10 per cent in the size of concrete beams and columns. This will re-establish design practices in common use before the war. From now on it will not be necessary for building designers to file a certificate declaring that the National Emergency Specifications for the design of reinforced concrete buildings have been followed. Building projects involving the use of five tons or less of reinforcing steel are now exempt from the necessity for complying with the national emergency specifications.

Directive 8, relating to National Emergency Specifications for the design, fabrication and erection of structural steel for buildings was amended to exempt from the emergency specifications construction projects requiring five tons or less of structural steel. Likewise, the necessity for the submission of a design certificate has been removed.

Price Briefs

Automotive parts—A new method for pricing used automotive parts, based on a percentage of the manufacturer's suggested retail price for the parts when new, has been established. Amdt. 3 to MPR 453. (Release No. OPA-4126)

•

Military equipment—Certain ski troop equipment and field ranges, Model 1937, has been exempted from price control until July 1. Amdt. 54 to Revised SR 1.

•

Transportation rates—Resellers of iron and steel products, such as warehousemen and jobbers, have been granted permission by OPA to use the lowest filed or published rail tariff rate of freight plus 3 per cent of such rate in computing delivered prices Amdt. 21 to RPS 49. (Release No. OPA-T-1922)

Machine Tool Preference Ratings Are Modified

• • • **Rules governing** approval of preference ratings assigned on form WPB-542 (formerly PD-3-a) by WPB field offices for machine tools have been modified. Under the new rules, contained in Directive No. 23, field offices may approve preference rating assigned by the armed services on these forms for the purchase of machine tools which were produced under DPC pool orders, despite the fact that other suitable equipment may be available.

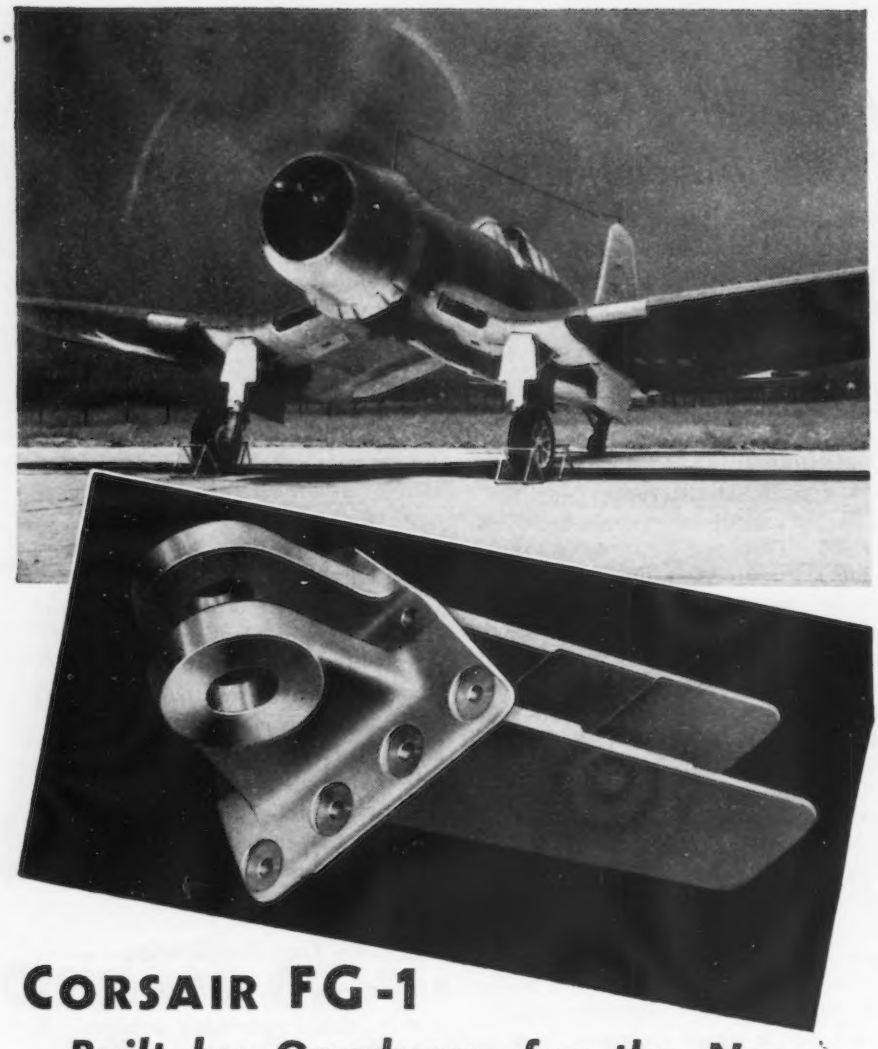
Formerly, WPB field offices could approve preference rating instruments for any machine tools without ascertaining the availability of other suitable equipment.

•

Re-allotment Procedure Set For Secondary Consumers

Washington

• • • **In cases** where a secondary consumer who has returned an allotment of controlled materials to a claimant agency finds that he has returned too much material, he may apply to the agency which received the return for a re-allotment of materials, according to Direction 26, as amended, to CMP Regulation 1.



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Weirton Takes Its First Shell Contract

Weirton, W. Va.

• • • **To fill** an urgent War Department contract, Weirton Steel Co. will enter the direct production of war munitions for the first time when it begins the manufacture soon of large caliber explosive shells.

According to Thomas E. Millsop, president, approximately 1500 additional employees will be required for the new operations. The company will conduct all manufacturing operations, beginning with the production of forging steel shell billets, and will ship finished shells to United States Army arsenals for loading.

Work will start immediately on alterations to plants and installations of new equipment necessary to the manufacture of the shells. It is estimated that this program will cost from four to five million dollars. The new facilities required will include forging, heat-treating, and machining equipment.

•

Canadian Firm Starts Work on New Shell Contract

Toronto

• • • **The Northern** Engineering & Supply Co., Ltd., has been awarded a contract for manufacture of shells which will be made at the Island No. 2 plant at Fort William. The plant was closed down last year when its shell contract ran out but will be reopened soon and about 500 persons will be employed. This is the first announcement made for several months regarding new contracts for shells.

CMP Developments

Brokers' sales—Procedure under which brokers and other intermediaries may pass on authorized controlled material orders from customers to sellers of such materials. Dir. 48 to Reg. 1. (Release No. WPB-5399)

•

Excess allotments—In cases where a secondary consumer who has returned an allotment of controlled materials to a claimant agency finds that he has returned too much material, he may apply to the agency which received the return for a re-allotment of materials. Dir. 26, as amended, to Reg. 1. (Release No. WPB-5400)

•

Filing Applications—Producers of controlled steel products receiving allotments of controlled materials for further conversion, pursuant to pgh. C of Reg. 8 are notified that application must be submitted by April 22. (Release No. CMPL-584)

•

Steel—The definition of the word "steel" as used in CMP regulations has been clarified. Int. 23 to Reg. 1. (Release No. WPB-5376)

•

Tinplate—Inventory restrictions on tinplate for cans relaxed for West Coast packing industry. Dir. 15 to Reg. 2. (Release No. WPB-5351)

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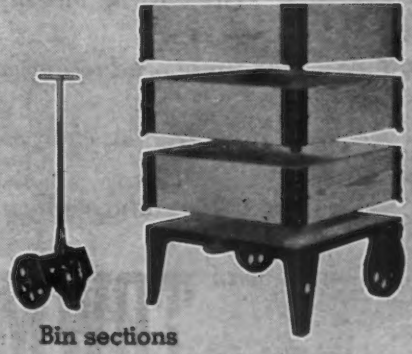

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Contract Cancelling Steps Taken by Army Outlined

• • • Pointing out that cancellations of war contracts must be given "most careful consideration," Lieut. Gen. Brehon Somervell recently issued a bulletin (the first on this subject under his name) covering Army Service Forces procedures in the implementation of changes in its programs. The bulletin amounts to a summary of Procurement Reg. 15. The principal steps are described as follows:

1. Requirements Division reduces required production with concurrence of Production Division and transmits revision to technical service involved.

2. Production Division advises Washington offices of WMC and WPB of impending change, and of the names of all facilities which may be involved, together with a preliminary estimate of the total number of employees who may be released.

3. The technical service obtains recommendations of its district procurement offices as to plants to be cut back.

4. Decision is made as to specific plants to be cut back.

a. Minor cutbacks approved by operating personnel in technical service.

b. Major cutbacks approved by technical service board of review.

c. All cutbacks involving government-owned facilities approved by headquarters board of review and Under Secretary of War.

5. Upon approval of specific plan for implementation of cutback:

a. District procurement offices notify regional offices of WMC, local labor and management; and, if cutback is of major importance, release statement to press.

b. Washington headquarters of technical service notifies War Department Bureau of Public Relations, War Department Special Staff, Director of Material, A.S.F., and Industrial Personnel Division, A.S.F. Washington offices of WPB and WMC are in turn notified by Army Service Forces Staff Divisions.

6. WMC plans for other utilization of labor to be released.

7. WPB plans for other utilization of facilities to be released.

The Requirements Division, A.S.F., supervises periodic general revisions of the Army Supply Program in the light of the most recent available information as to troop basis and de-

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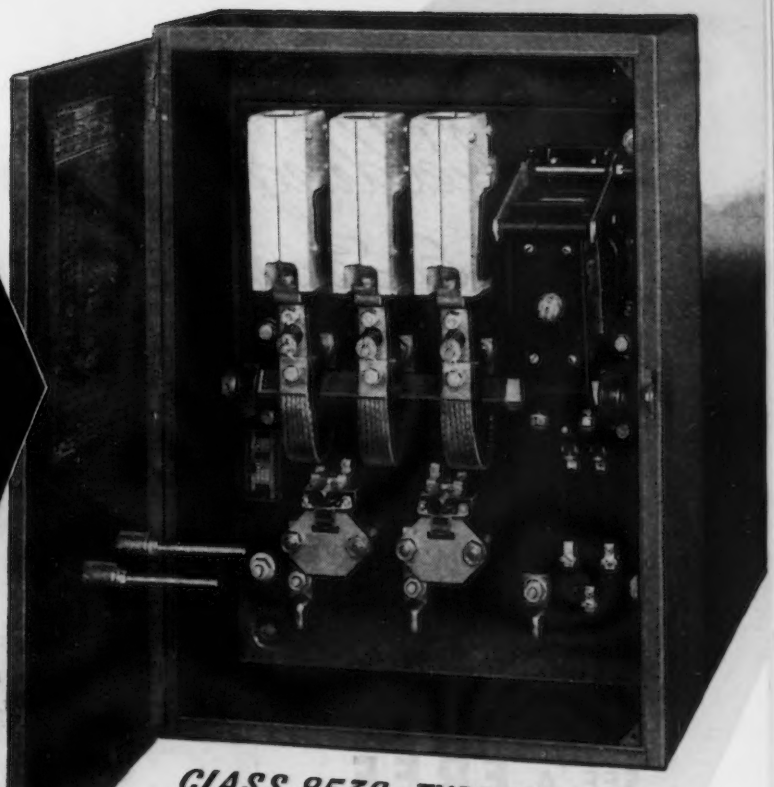

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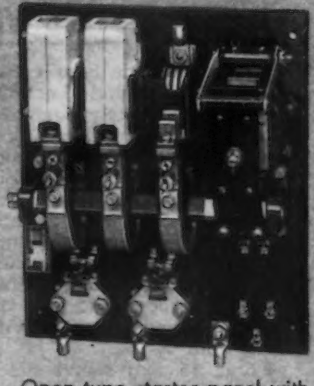

Open type starter panel with one arc chute removed to reveal contacts and blowout coil.

Side view of panel shows "E" type magnet, floating armature and new shading coil.

ELECTRICAL EQUIPMENT • KOLLSMAN AIRCRAFT INSTRUMENTS

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ployment, tables of equipment and allowances, stocks on hand, issues, replacement factors, etc., in accordance with A.S.F. Circular No. 67. In addition, interim changes in Army Supply Program objectives for specific items are processed whenever warranted.

Information concerning approved program changes and as soon as available in the case of reductions, the names and locations of all facilities producing the items, and a preliminary estimate of the total number of employees to be released is disseminated at weekly meetings held by the Production Division. These meetings are attended by representatives of the Industrial Personnel Division, A.S.F., the Deputy Vice-Chairman for Production, WPB, and the Bureau of Planning and Statistics, as well as interested branch chiefs of the Production Division. This information also is forwarded to the following: Tudor Bowen, director, Procurement Policy Division, WPB; H. E. Riley, Office of the Vice-Chairman for Manpower Requirements, WPB; Joseph D. Keenan, vice-chairman for Labor Production, WPB; Colonel Ralph R. Gow, Bureau of Public Relations, War Department; Major Bryce N. Harlow, Legislative and Liaison Division, W.D.S.S.

In selecting contracts to accomplish the necessary readjustment and curtailment of production the factors considered include:

(a). The effect upon the available supply of labor. Cutbacks and cancellations in Number I and Number II Labor Areas will, depending upon the magnitude of the reduction, ease or terminate the difficulty of securing

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These sound slide films entitled "Let's Get The Low-down" and "Let's Do It Right" are the only completely compiled technical information available *anywhere* on the advantages of, proper procedure and application in Metallic Arc tool steel welding. Companies have already realized definite savings in materials and man hours through the information contained in these films.

Let your master mechanics, superintendents, foremen, welding operators, designing engineers, process and tool conservation personnel *see* and *hear* this vitally important sound film.

These 35 mm sound slide films will be shown to your organization without obligation.

THIS BOOK TELLS ALL!

This book is available to all those men who have seen this double feature, and serves as a "refresher" of the technical data contained in the film.

EUREKA TOOL STEEL ELECTRODES FIND THE SPOT

Welding Equipment & Supply Co.

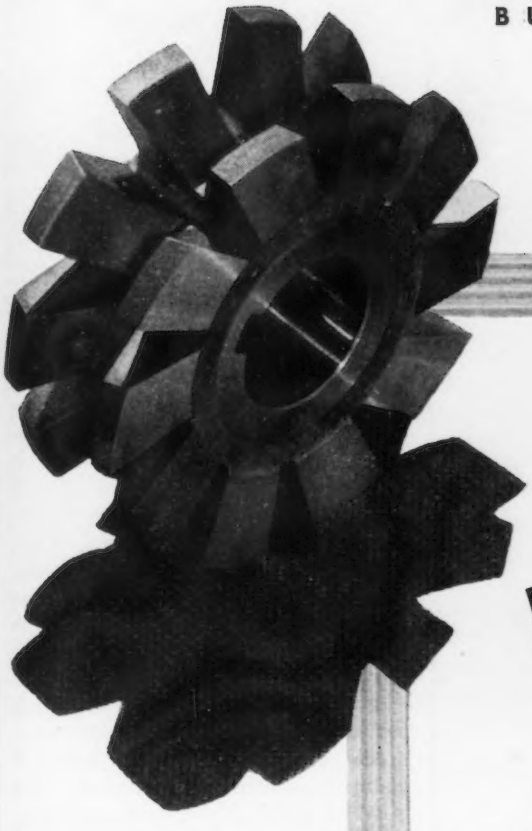
WELDING ENGINEERS WITH A COMPLETE SERVICE

230 LEIB STREET • FITZROY 3715 • DETROIT 7, MICHIGAN

What would be a better investment for you than to have your plant personnel see the many advantages in this specialized welding field? These films can be exhibited with any standard 35 mm sound projection equipment. Write us today for details.

"I HAD A NIGHTMARE LAST NIGHT, JOE. I DREAMT YOU TOOK THE DAY OFF!"

BUY U. S. BONDS AND STAMPS



There are

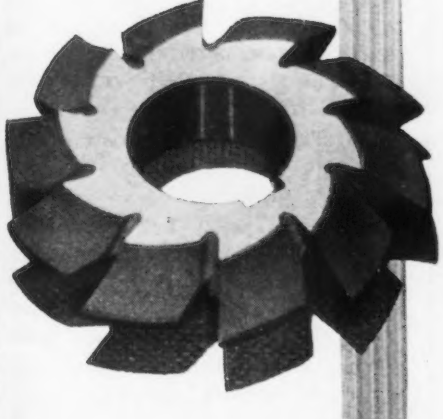
FORM RELIEVED "TOMAHAWKS"

too — — —

Genesee Tool Company is one of the few major tool companies completely equipped to produce *in quantities* both ground and unground form-relieved cutters of virtually all types—on short deliveries (6 to 8 weeks at the time this was written).

Thousands of these **"TOMAHAWK"** form-relieved cutters have been doing Yeoman's duty in turning out better war products.

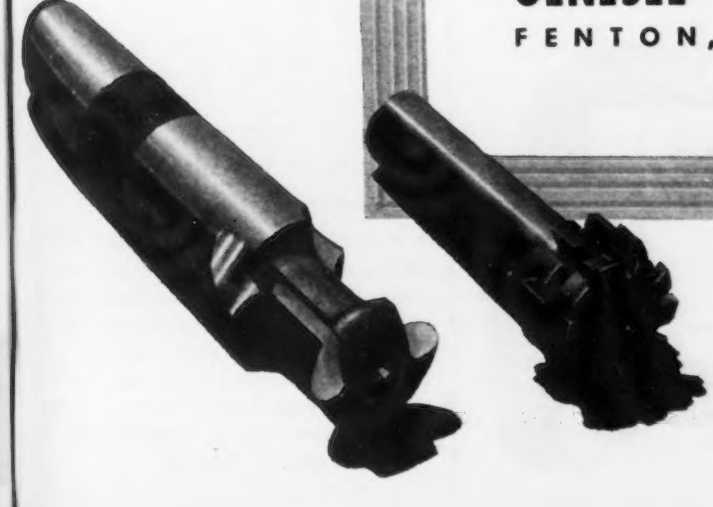
We will be glad to quote you on your requirements.



GENESEE TOOL COMPANY

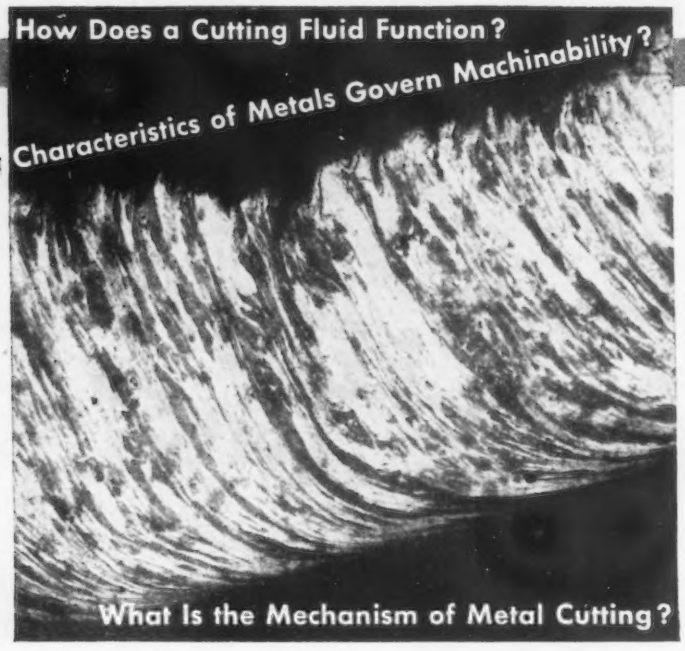
FENTON, MICHIGAN

* Registered Trade Mark



THE IRON AGE, April 13, 1944—115

Consider the Lowly Chip..


How Does a Cutting Fluid Function?
What Characteristics of Metals Govern Machinability?
What Is the Mechanism of Metal Cutting?

What Knowledge Its Gnarled Features Hide!

We're moved to poetic expression when we contemplate the great advances in metal-working which become possible as more and more is learned about the formation of a metal chip. Too long the chip has been taken for granted as just something which happens when you cut metal. Scientific investigation is bringing to light data which may greatly alter present day conceptions of tool angles, depth of cut, tool speeds, cutting fluids and other factors which are a part of metal cutting.

Through study of the metal chip come further answers to three fundamental questions: "What is the mechanism of metal cutting?" "What characteristics of metals govern machinability?" and "How does a cutting fluid function?"

A REQUEST OF STUART CUSTOMERS

Containers of all types are critically scarce. We urge you to cooperate with the W.P.B. program to conserve containers by observing these four rules for handling drums.

1. Do not drop.
2. Use a little oil to avoid stripping threads in removing plugs.
3. Replace plugs carefully when drum is empty.
4. Keep drums under cover when emptied.

We at D. A. Stuart Oil Co. are probing these mysteries with all the tools and techniques science makes available. We don't know all the answers yet, but we're learning them fast. As our research engineers inch closer and closer to the truth about the metal chip, their findings are reflected in improved cutting fluids—*to do a better job for you.*

We invite you to write for our new free booklet, "The 577th Oil," which contains twenty-two case histories, typical examples of how Stuart Oil Engineering is solving production problems (like your own), as well as other valuable metal-working data. Please state your name, company and title.

adequate labor for other war contracts.

(b). In order to carry out the intent of Public Law No. 603, Smaller War Plants, defined as independent concerns with 500 wage earners or less, are retained in a program wherever practicable. Large contractors whose volume is reduced in a curtailment program are urged not to cut their subcontracting volume to small plants by an amount greater proportionately than their own reduction.

(c). The prospective alternative uses for the plants under consideration, including the possibility of their use in other war work, the desirability of retention in standby or their employment in other essential production. It may be advisable to make reductions in the contracts at facilities which are having difficulty in meeting desired schedules in order to enable such facilities to improve their performance on remaining contracts.

(d). Arrangements are made to maintain government-owned facilities in which production is materially curtailed or terminated in standby until the productive capacity is clearly no longer required for military needs.

(e). Security considerations.

(f). The effect on public transportation; that is, accessibility to the sources of raw materials, components, depots or storage facilities and ultimate destination.

(g). The relative unit costs of production to the government of plants producing the same item.

A general policy has been established to the effect that wherever practicable the reserve capacity of industry will be used in lieu of the production of reserves of complete end items.

When idle facilities and production equipment owned by the War Department have been duly circularized in accordance with established procedures and no use in war production has been developed, they are disposed of under the provisions of War Department Circular No. 8 or Procurement Regulation No. 7.

Institute of Metals Meets In London; Officers Elected

• • • **Election** of officers for 1944-45 was announced at the 36th Annual General Meeting of the Institute of Metals held in London on March 15. They are as follows: Dr. W. T. Griffiths, president; G. L. Bailey, vice president; members of the council are: J. H. Andrew, W. H. Henman, W. A. Newman, and S. Robson.

GIVE W·A·B CONTROLS A PLACE IN YOUR PLANNING

Moving tons—

yet responsive to a finger-touch through

W·A·B controls

One of the best ways of getting a picture of the service possibilities of W·A·B Control Systems in *your* plant or product is to see what they are doing for others.

Take cranes, for instance . . . where W·A·B Controls have greatly lightened and simplified the operator's job.

The precision clutching operations necessary for the exact control of speed and motion at the beginning and the end of a lift are initiated by a W·A·B Flexair valve. Pressures are proportional to handle movement, giving the same sensitive, smooth response in handling many tons of load that you get from the clutch of your car. Other valves on the same control stand govern other functions, concentrating complete command of the equipment under the hands of the operator.

The play and other complications of mechanical linkage are completely eliminated. No physical effort is required of the operator. And equipment is safeguarded by interlocks, which make it impossible to set up two opposing operations.

If you are thinking about production or product improvement—wherever a remote control problem is involved, you'll find it profitable to give W·A·B Controls a place in your planning.

Westinghouse Air Brake Company

INDUSTRIAL DIVISION

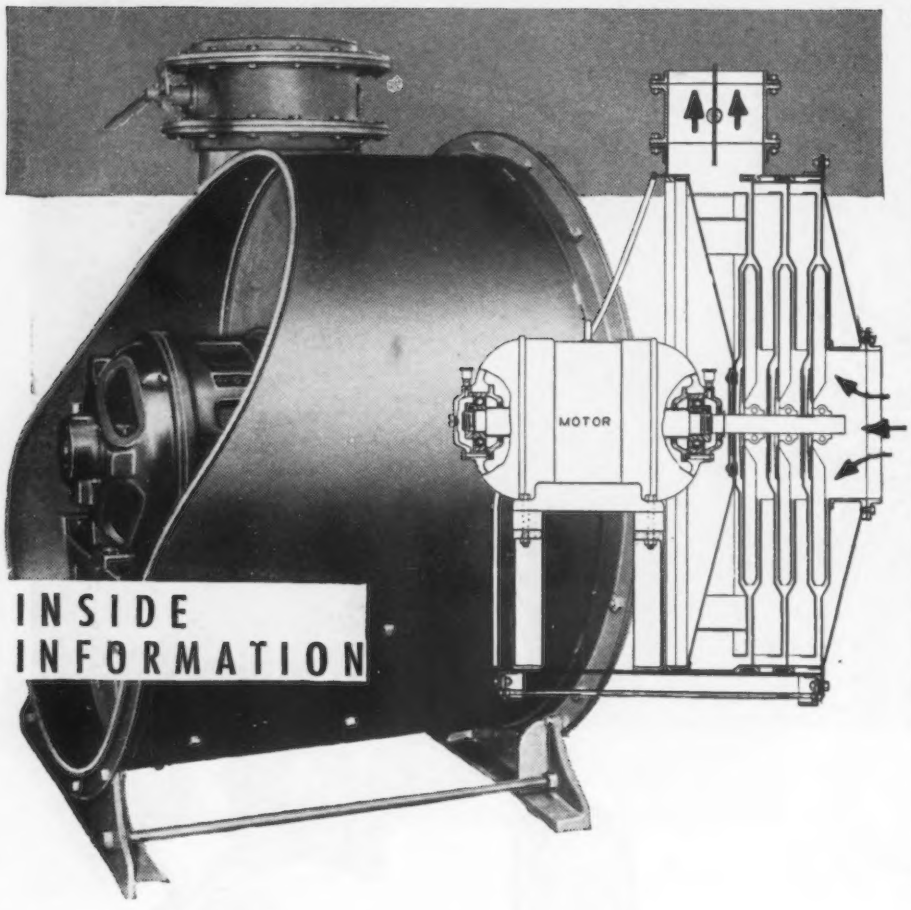
General Offices: Wilmerding, Pa.

75 Years of Pneumatic Control Experience

W·A·B

Pneumatic . . . Pneumatic-Electric . . . Pneumatic-Hydraulic

control systems



Spencer Turbos are shipped "ready to use," require no special foundations, and work quietly and reliably for years without "tear downs," overhauls or repairs. Therefore few people know what "makes them tick" or realize that their very simplicity is responsible for the outstanding performance records.

The cross-section view above shows a series of light weight impellers clamped to a large shaft which rotates on the two motor bearings.

Air Pressure is constant regardless of load. Power used varies with the volume of air delivered. A one-piece casing, and a bridge-type motor support, plus perfectly balanced impellers with wide clearances, account in part for the long-life service rendered and the extremely low costs for maintenance and repair.

SPENCER
HARTFORD

If interested, the Spencer Turbo Data Book and the Spencer Bulletins will give you all the information.

THE SPENCER TURBINE COMPANY • HARTFORD 6, CONNECTICUT

TURBO-COMPRESSORS

Aircraft Surplus Materials Sales Total $1,320,000

New York

• • • **Sales of excess** inventories by the five eastern aircraft manufacturers staging the two-week surplus materials exhibit at the McAlpin Hotel under the auspices of the New York regional office of WPB exceeded $1,320,000, representing 748 deals during the first week. The figures included sales actually closed, sales in actual process of negotiation, and sales made but awaiting approval. Prospective sales indicated by inquiries but not in conclusive negotiation were not included. A large volume of sales in the latter category are expected to result from the activities of the first week of the exhibit. In that connection, it was pointed out, many deals opened at the exhibit moved to the respective plants of the participating companies for further negotiation.

For details of buying procedure at this show see THE IRON AGE, *March 30, 1944, page 95.*

Divided as to classes of materials, the week's reported transactions included these: 839,555 lb. of steel (various types), $198,435; 718,957 lb. of aluminum (various items), $231,276; and hardware, tools and miscellaneous items, $190,745.

Sales reported also were broken down into the following categories: Sales to manufacturers, 468 totalling $914,053; sales to dealers, distributors, etc., 267, totalling $375,947; sales to warehouses, 13, totalling $30,0000.

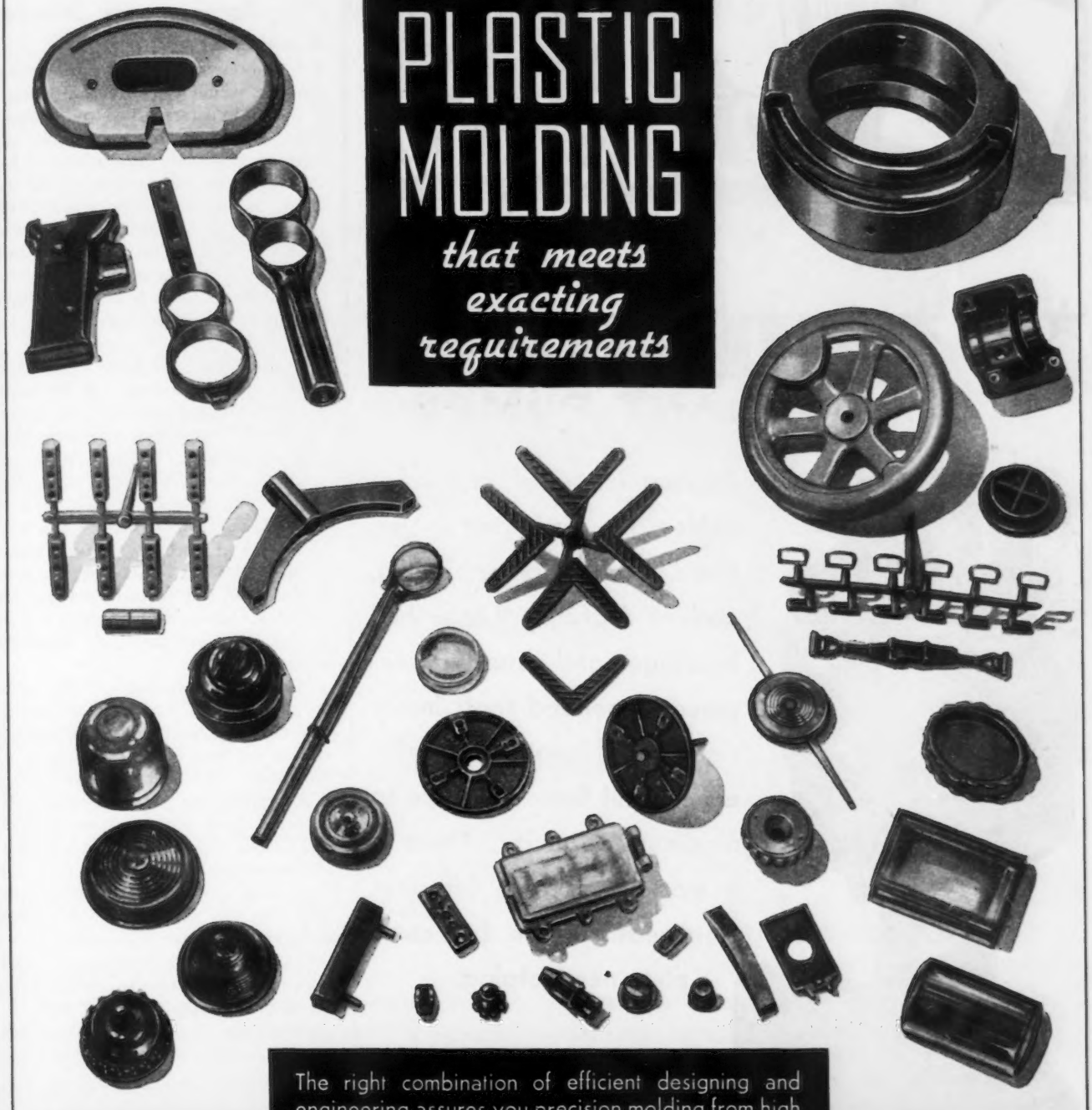
Among individual sales included were the following: 290,000 lb. of stainless steel tubing, $95,000; 2,000,000 ft. of aluminum extrusions, $80,000; 160,400 ft. of rubber mat, $70,000; 230,000 lb. of aluminum sheet, $70,000; 10,000 lb. of damaged aluminum, $3500; 100,000 lb. of steel sheet, $25,000; 6000 doz. drills. $12,000; 60,000 ft. Packard cable, $5000; 40,000 ft. of flexible conduit, $5000; 25,000 lb. of brass bar and rod, $3000; 50,000 tools, $15,000; 1,300,000 ft. of copper wire, $8000; 500,000 lb. of fibre glass, $20,000; and 226,463 lb. of steel, $8000.

The first week's registered attendance was reported as 2120 buyers and dealers. Numerous low bids for large quantities were rejected, it was reported, most sales being at or close to market levels.

Precision

PLASTIC MOLDING

that meets exacting requirements



The right combination of efficient designing and engineering assures you precision molding from high quality thermoplastic materials. Your exacting requirements are met promptly, efficiently and accurately, from small intricate designs to large 18 oz. moldings. Complete complementary equipment to answer your demand for plastic moldings, including complete dash panels, garnish moldings and similar trim.

Due to the allocation control of plastic materials, our production is at present restricted to direct war and essential civilian work.

Main Office and Plant
Este Ave. and Orient St.
Cincinnati, Ohio

Branch Plant — Sales Office
Richmond, Indiana

Sales Office
Detroit, Mich.

Buy WAR BONDS

ARMY E NAVY

The METAL SPECIALTY *Co.*

MAIN OFFICE AND PLANT • ESTE AVENUE • CINCINNATI OHIO

PLASTIC DIVISION

No leakage

★ ★ ★ **GUSHER**
COOLANT PUMPS

Packing nut, foot and relief valves are eliminated — yet, there is no friction or binding, *and no leakage*. Large ball bearings and sturdy one-piece suspended shaft insure rigidity and longer life. Delivers coolant from a dribble to maximum capacity. There is a model and type for your needs. Write for complete new catalog.

Model 11020-A

Internal discharge type. Outside piping eliminated. From 1/10 to 3/4 h.p.

THE RUTHMAN MACHINERY CO.
1821 READING ROAD CINCINNATI 2, OHIO
The "Gusher"—A Modern Pump for Modern Machine Tools.

Balkans' Importance To Germany Stressed

Washington

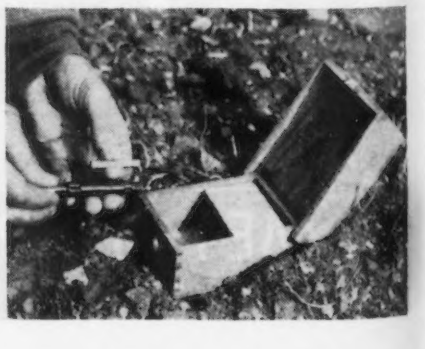
• • • **Germany's ability** to continue the war would be seriously impaired if the oil and ferroalloys of southeast Europe were no longer available, said Foreign Economic Administrator Leo T. Crowley in an analysis of the economic importance to Germany of the Balkans, now invaded by the Soviet Union forces. The analysis, made public on April 4, was prepared by the Special Areas Branch in which FEA's economic warfare operations are centered.

If the Ploesti oil fields in Rumania were captured or cut off, Germany would lose about one-third of its total supply of natural and synthetic oil, it was pointed out. Loss of the chrome of the Balkans and Turkey, the study showed, would deprive Germany of virtually its entire supply of a vital ferroalloy and would have an immediate and serious effect on the production of steel for Germany's armament industry, already seriously hit by British and American air bombardment.

"Germany's shortage of the ferroalloys essential to steel production has recently been made much more serious by the Soviet's recapture of Nikopol, in the Dnieper bend" it was said. "Nikopol's mines have been the enemy's chief source of manganese. The loss of this vital alloy has greatly increased the importance to Germany of chrome, another ferroalloy necessary for the manufacture of armament steel.

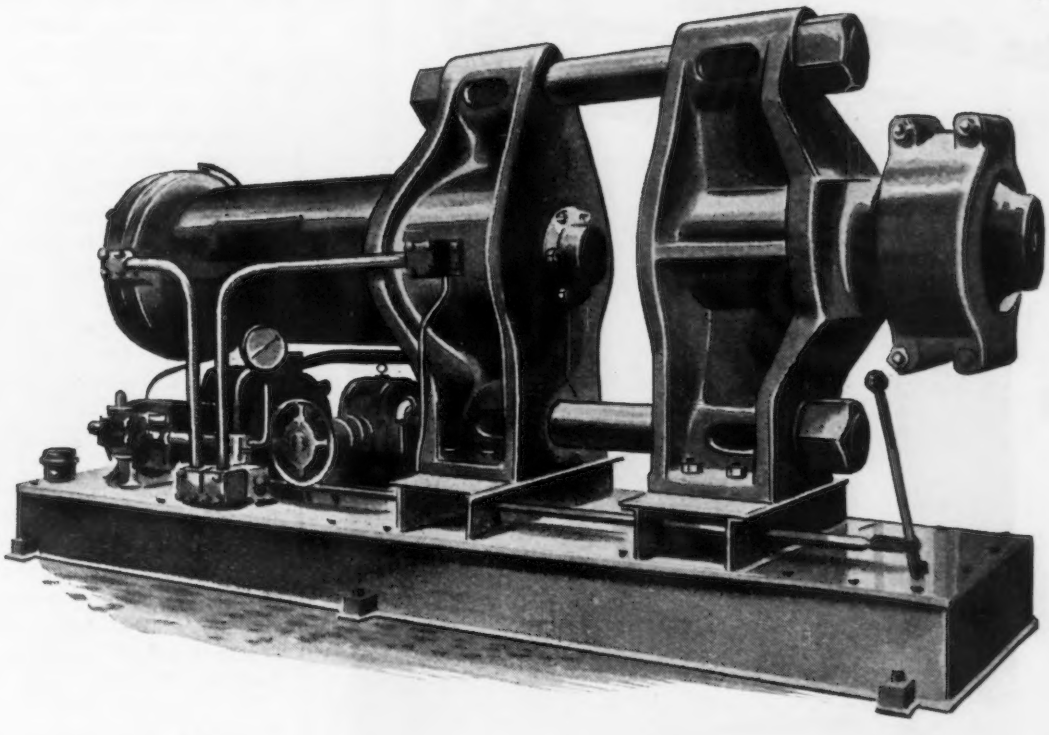
"Virtually all of Germany's chrome comes from Turkey and the Balkans, which also supply Germany with lesser amounts of other ferroalloys and with important quantities of the cop-

NON-METALLIC MINE: *Using wooden boxes instead of metal to foil detection devices, Germans are now planting this new type anti-personnel mine. The cigarette shows the approximate size of the detonator.*



HOW A WELDING ROD SLIPS ON ITS OVERCOAT

A "natural" for HELE-SHAW FLUID POWER

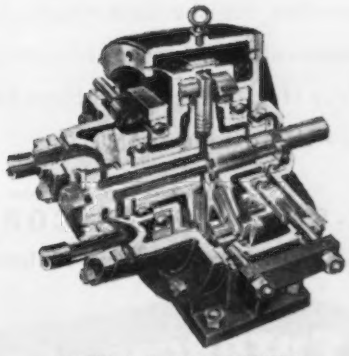


WELDING RODS are "coated" with a compound imparting certain properties to the arc or weld metal. Most welding rods are coated by an extrusion process which slips on a thin, uniform, tightly-fitting coat under tremendous pressure. Because of the high pressure and snail's pace, control is a ticklish factor.

For these conditions, Hele-Shaw Fluid Power, as one rod maker found, is a natural. The Hele-Shaw Pump holds high pressures at the desired rate of flow. Automatic pressure and volume controls make possible continuous, uniform extrusion.

Hele-Shaw Fluid Power and Hele-Shaw engineers are making many more notable improvements in processes, machines, and equipment. In fairness to yourself and your future customers, look into Hele-Shaw Fluid Power operation now.

THE
Hele-Shaw
Fluid Power Pump

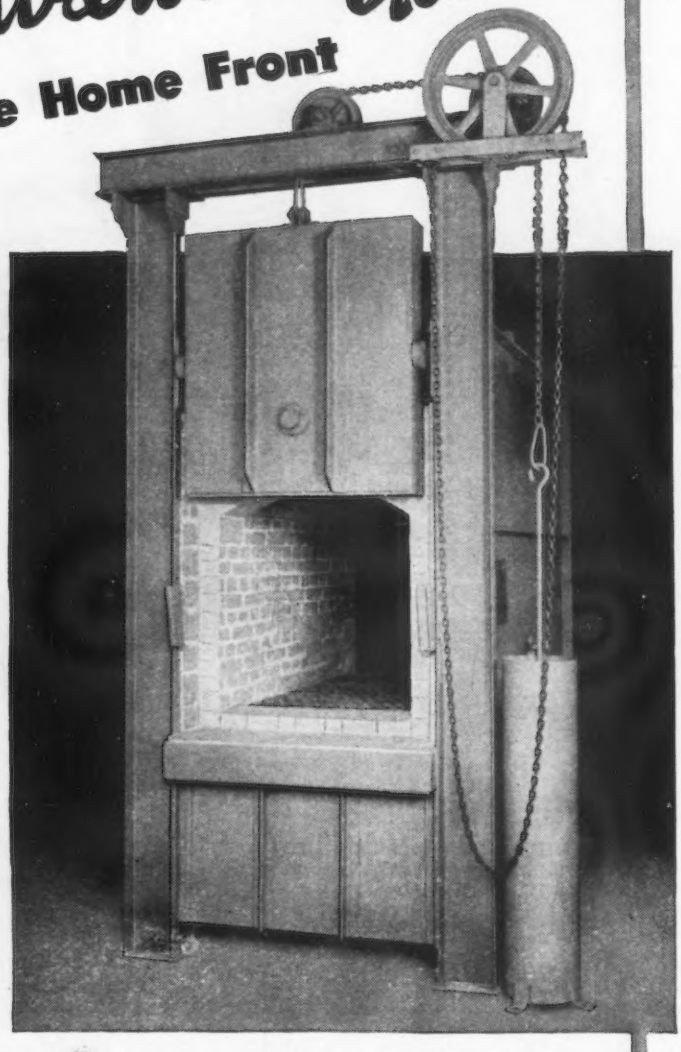


OTHER A-E-CO PRODUCTS:
TAYLOR STOKERS, MARINE DECK AUXILIARIES, LO-HED HOISTS

AMERICAN ENGINEERING COMPANY

2410 ARAMINGO AVENUE • PHILADELPHIA 25, PA.

Whirlwind Action on the Home Front



Chamber
30 inches wide
30 inches high
54 inches deep

"Whirlwind" because of the circulation of a large volume of high velocity air, this R-S Electric Box Type Furnace is especially noteworthy because of its rugged construction and typical R-S efficiency. Constructed in various sizes for the heat treatment of aluminum and magnesium alloy stampings or castings. Prompt delivery.

If Your Heat-Treating Problem Is Urgent, Ask R-S by 'Phone—GLAdstone 1050.

FURNACE DIVISION
R-S PRODUCTS CORPORATION
4524 Germantown Avenue, Philadelphia 44, Penna.

R-S Furnaces of Distinction

ANNEALING · CONVECTION · ROTARY HEARTH · SALT BATH · FORGING
CONTINUOUS CONVEYOR · PLATE AND ANGLE HEATING · METAL MELTING · CAR HEARTH

★ ★ BUY WAR BONDS ★ ★

per that Germany also needs for war production. Continued control of the Balkans is thus of urgent economic importance to Germany not only for the metals she gets from the mines of the Balkans themselves, but because the railroads of the Balkans are the supply lines over which these metals reach Germany from Turkey."

The Balkans have been of little industry value to Germany, it was pointed out, although some industrial expansion has occurred under German direction. The Balkans have a certain amount of ore concentrating and smelting plants, but their manufactures have been largely consumed locally and few industrial workers have been drawn from this area for work in the Reich.

The total economic contribution of the Balkans and Turkey to the enemy war machine is, however, so important under present circumstances that Germany, for economic reasons alone, is likely to make every possible effort both to prevent industrial Balkan states from carrying out separate peace operations and to defend the area vigorously from attack.

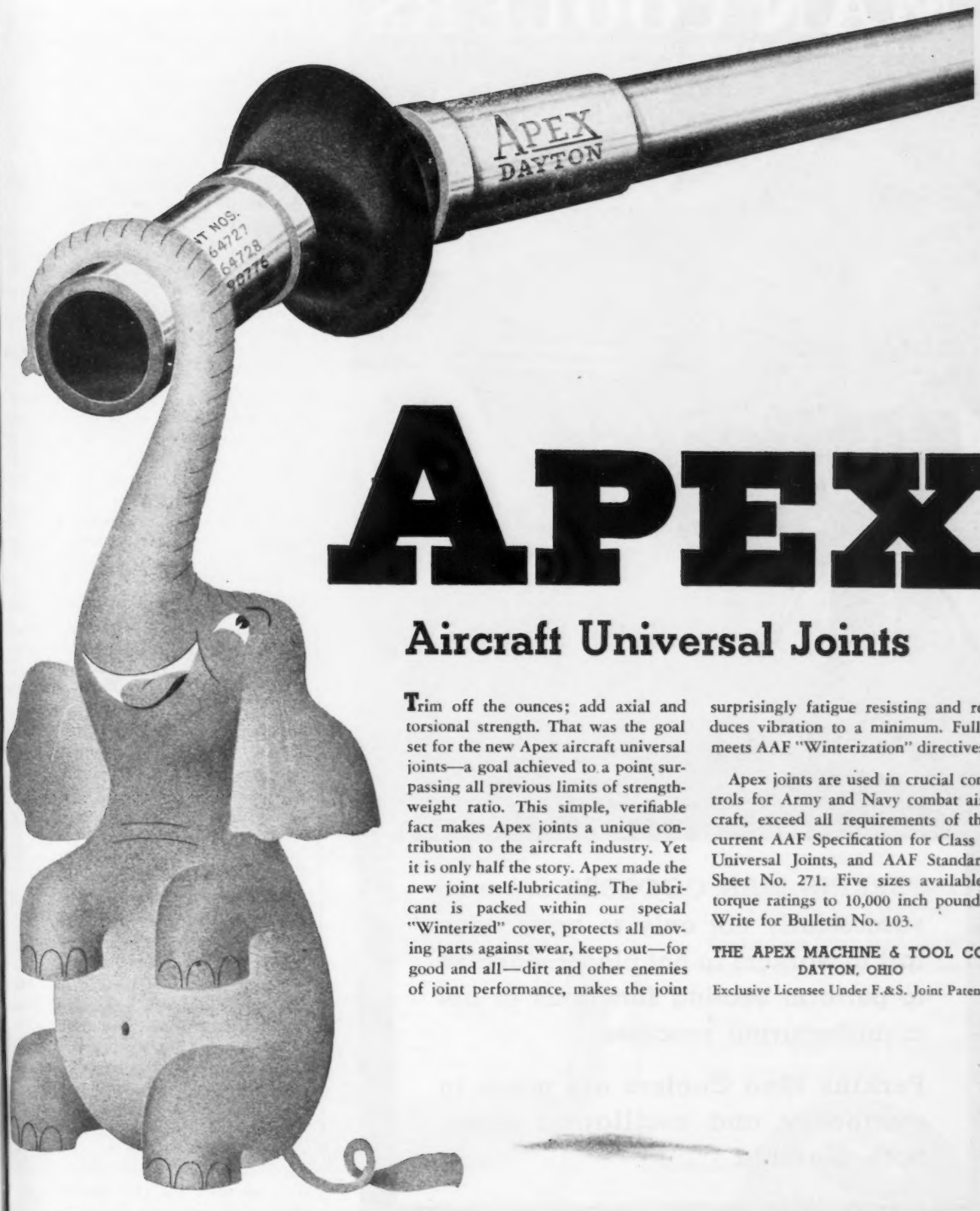
Canada Switches Aircraft Output to Commercial Types

Toronto

• • • **According to** announcements made by C. D. Howe, minister of Munitions and Supply, Canada is gradually swinging from the production of fighting aircraft to those in the civilian category. Earlier it was reported in government circles that Victory Aircraft, Ltd., Malton, Ontario, soon would enter production of the four-engined Douglas DC-4 plane, which has been selected for the main trans-Canada airline operation. During the past week Mr. Howe stated in the House of Commons that the manufacture of the four-engined Douglas DC-4 already has been started in the government owned and Canadian Vickers operated plant at Montreal.

Mr. Howe stated: "We have come to the conclusion that the task of designing a four-engined plane suitable for both postwar domestic traffic and transcontinental routes and for international traffic is beyond the present capacity of our industry. Therefore we have acquired rights to build a plane that is considered by our experts to be the probable best plane of the next five years at least." However, the planes will not be released to our airlines until new planes are released to airlines in the United States.

Highest Strength-Weight Ratio yet obtained



APEX

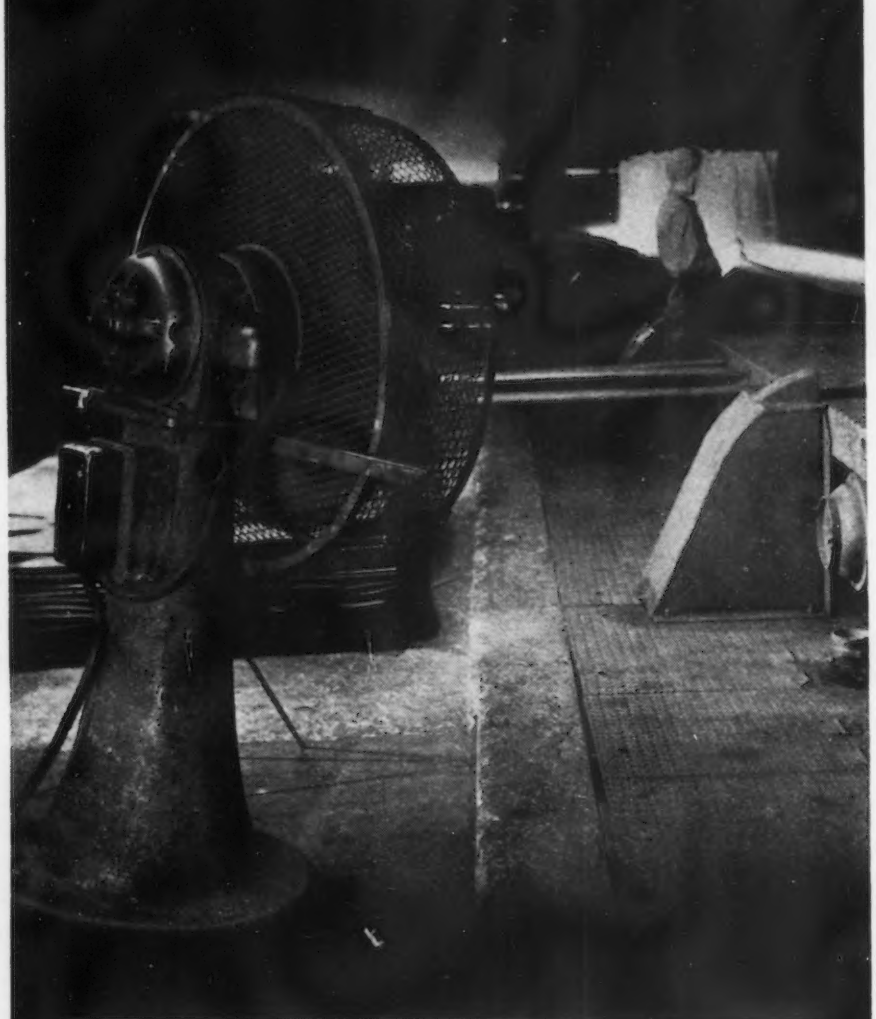
Aircraft Universal Joints

Trim off the ounces; add axial and torsional strength. That was the goal set for the new Apex aircraft universal joints—a goal achieved to a point surpassing all previous limits of strength-weight ratio. This simple, verifiable fact makes Apex joints a unique contribution to the aircraft industry. Yet it is only half the story. Apex made the new joint self-lubricating. The lubricant is packed within our special "Winterized" cover, protects all moving parts against wear, keeps out—for good and all—dirt and other enemies of joint performance, makes the joint surprisingly fatigue resisting and reduces vibration to a minimum. Fully meets AAF "Winterization" directives.

Apex joints are used in crucial controls for Army and Navy combat aircraft, exceed all requirements of the current AAF Specification for Class 2 Universal Joints, and AAF Standard Sheet No. 271. Five sizes available; torque ratings to 10,000 inch pounds. Write for Bulletin No. 103.

THE APEX MACHINE & TOOL CO.
DAYTON, OHIO
Exclusive Licensee Under F.&S. Joint Patents

PERKINS
MAN COOLERS
TRADE MARK REGISTERED UNITED STATES PATENT OFFICE



PERKINS MAN COOLERS are used successfully not only to bring comfort to workers in hot places, but also to perform cooling functions in hot manufacturing processes.

Perkins Man Coolers are made in stationary and oscillating types, both portable.

B. F. PERKINS & SON, Inc.
HOLYOKE, MASS., U.S.A.

Output Boosted by WLB Incentive Systems

Chicago

• • • **Wage incentive** plans approved by the Sixth Regional War Labor Board, and inaugurated in 102 plants in the board's six state area, have resulted in a 28.7 average increase in production; an 18 per cent average increase in workers' earnings; and an 11 per cent average decrease in unit labor costs, the board announced following a survey.

Up to Feb. 15, this board had approved 165 new incentive plans. The plants included in the survey were those which had completed 90-day probationary periods under wage incentive schemes, affecting about 10,000 workers.

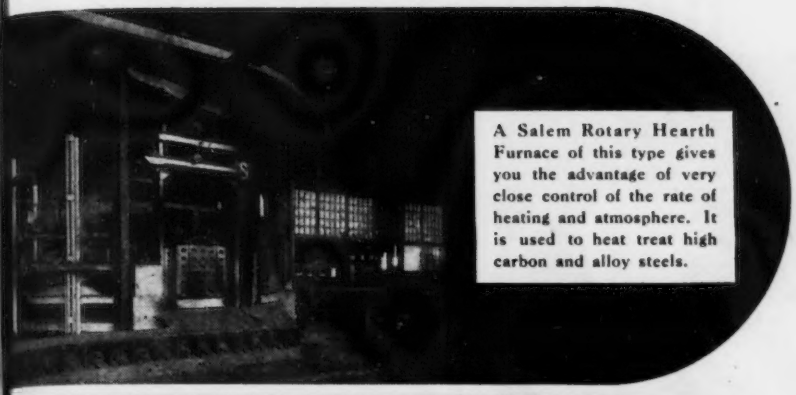
The Chicago regional board had denied only 15 incentive plan applications through Feb. 15. However, all but 27 of the 165 plans approved, changes in original application were necessary. All WPB approvals of new plans call for a re-check of the plans after they have been in operation 90 days.

In only two of the 102 plans checked, after the 90-day period, have increases in unit labor costs resulted. This may necessitate changes in plans in these two plants. New standards also may be necessary in three cases in which excessive increases in earning were reported, or in other cases where increases in production and earnings were far out of proportion. In one of these cases, new standards already have been established with approval of both management and labor. One company reported a 300 per cent increase in production and an increase in earnings from 79½c. to $2.25 per hour. Another reported increases in both production and earnings of 80 to 90 per cent.

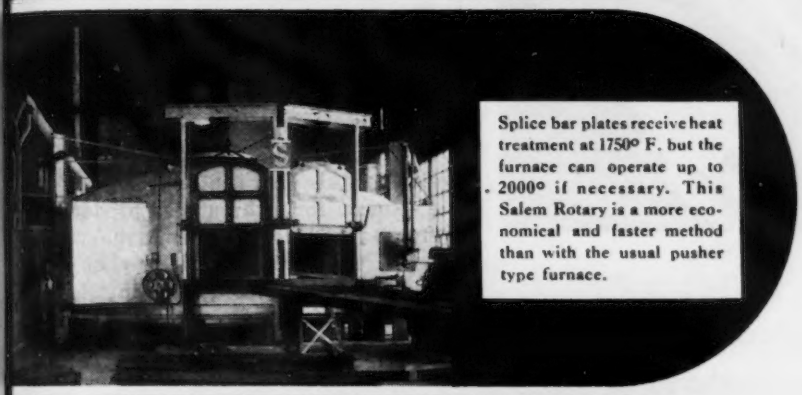
These few examples indicate that improper standards were established, the board chairman declared. "This is what we are trying to guard against by careful analysis of the plans prior to their adoption. The 90-day probationary approval, which the WLB grants, gives an additional safeguard by affording an opportunity to correct such discrepancies which may show up after the plan has been put into actual operation."

The 102 wage incentive plans surveyed include a wide variety. In 30 of the plants, there are unions as recognized bargaining agents — 10 AFL, 14 CIO and 6 independent. The

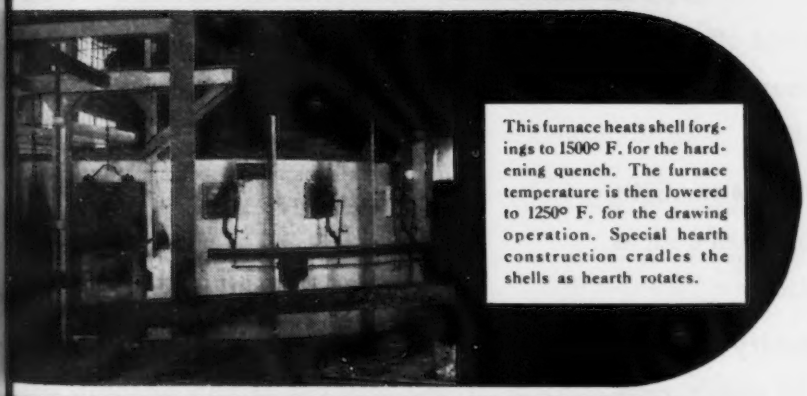
Make Your Conversion For Postwar Operations Less Troublesome By Contracting Now For a Versatile SALEM ROTARY HEARTH FURNACE



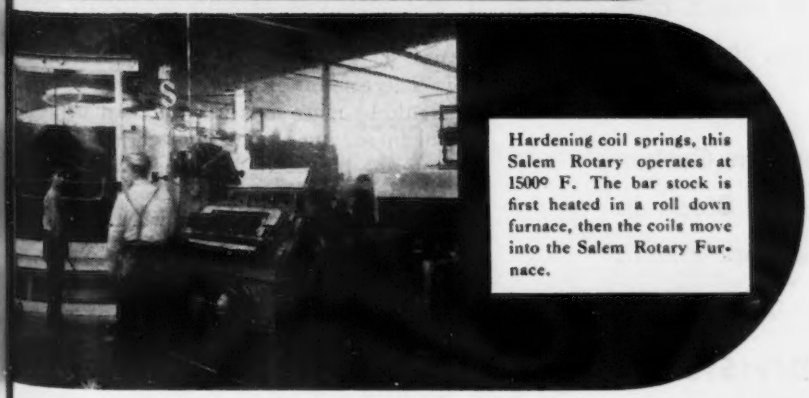
A Salem Rotary Hearth Furnace of this type gives you the advantage of very close control of the rate of heating and atmosphere. It is used to heat treat high carbon and alloy steels.



Splice bar plates receive heat treatment at 1750° F. but the furnace can operate up to 2000° if necessary. This Salem Rotary is a more economical and faster method than with the usual pusher type furnace.



This furnace heats shell forgings to 1500° F. for the hardening quench. The furnace temperature is then lowered to 1250° F. for the drawing operation. Special hearth construction cradles the shells as hearth rotates.



Hardening coil springs, this Salem Rotary operates at 1500° F. The bar stock is first heated in a roll down furnace, then the coils move into the Salem Rotary Furnace.

★

● When the time comes to switch from war production, you will appreciate the ease with which a Salem Rotary Hearth Furnace can be adapted to a change-over.

By adding a Salem Rotary to your production line *now*, you will be in a position to process your new postwar products quickly when the green light flashes for the "go-ahead."

Salem builds all sizes of Rotary Hearth Furnaces, small, medium, or large. For instance, in 1942, we installed the world's largest rotary heat treating furnace (2100 sq. ft. of hearth area) and on this page, we illustrate several smaller size Salem Rotary installations.

★

Get These Four Advantages

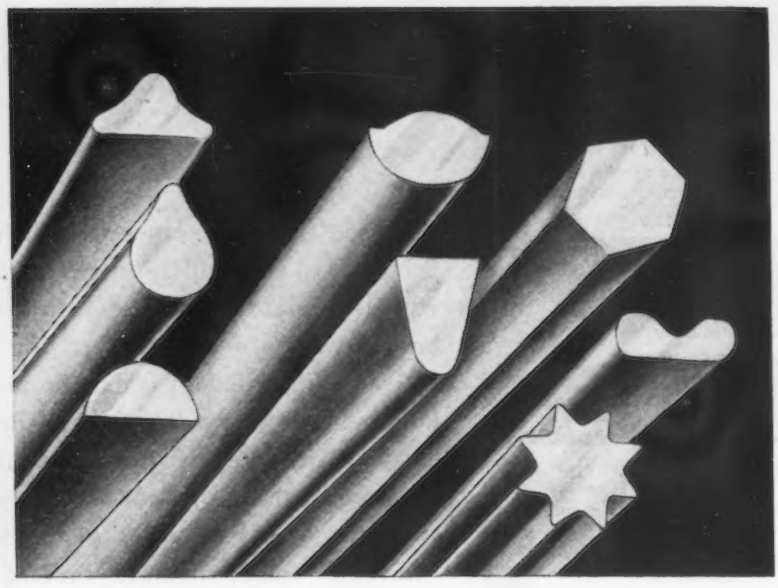
1. The Salem Rotary Hearth is self-emptying as compared to the pusher type.
2. The small openings in the Salem Rotary Hearth Furnace save fuel over a batch type.
3. With the Salem Rotary Hearth, the material is always moving. It never gets a chance to rest for more than a few seconds under a direct flame.
4. The Salem Rotary Hearth provides ideal loading and heating conditions.

SALEM ENGINEERING COMPANY:
Makers of All Types of Industrial Furnaces; Walk-in or Automatic Type Locker Plants; Refrigeration and Air Conditioning Systems

SALEM ENGINEERING COMPANY

SALEM ENGINEERING CO. · SALEM, OHIO

PAGE *Shaped* WIRE



CUT production costs by purchasing PAGE Shaped Wire—produced to your own special requirements. PAGE offers you the accumulated experience of many years of manufacturing and research facilities.

A discussion of your program with PAGE might well mean the development of your basic ideas to a definite saving in your product.

PAGE will welcome the opportunity to plan with you. Get in touch with us in ample time so that, when we all get the "green light," we will both be ready.

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72 other plant do not have union affiliations.

If a union exists as the recognized bargaining agent for employees, the WLB requires that union representatives sign the application for approval of a new incentive plan. If no union exists, the company is required to certify that the plan has been explained to employees and that they understand and approve the proposed wage incentive plan.

Of the 102 plans, 54 are operating on a group incentive basis, 39 on an individual incentive basis, and nine on a combined group and individual basis.

Birmingham Attempts to Solve Coming Labor Crisis

Birmingham

• • • **The Labor** Management Committee of the War Manpower Commission for this area is attempting to find a solution for a threatened production slump that faces the Birmingham District. The committee holds that production in war essential industries is certain to drop unless 13,000 or more workers can be recruited before July 1. This need in large part is occasioned by anticipated military withdrawals.

Although definite steps to meet what it termed "an extremely grave situation" were postponed pending further study of the complex question, the committee at a meeting March 31 agreed that a solution depended on one or more of the following: 1—The employment of more women. 2—Capacity production per individual worker. The committee agreed that absenteeism, limited working time, and the failure of workers to realize their individual responsibility contribute to the problem of production. 3—The use of 4-F's in essential industries.

The committee held that legislation would be more detrimental than helpful in solving the manpower problem, but it discussed the possibility of steering more of this group from non-essential to essential work.

E. F. Blank Appointed to WLB

Washington

• • • **The National War Labor Board** recently announced the appointment of Earl F. Blank, director of personnel relations for Jones & Laughlin Steel Corp., Pittsburgh, as substitute industry member of the board. Mr. Blank has been associated with the steel industry for the past 18 years.

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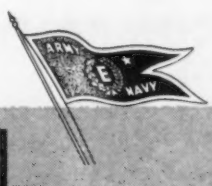

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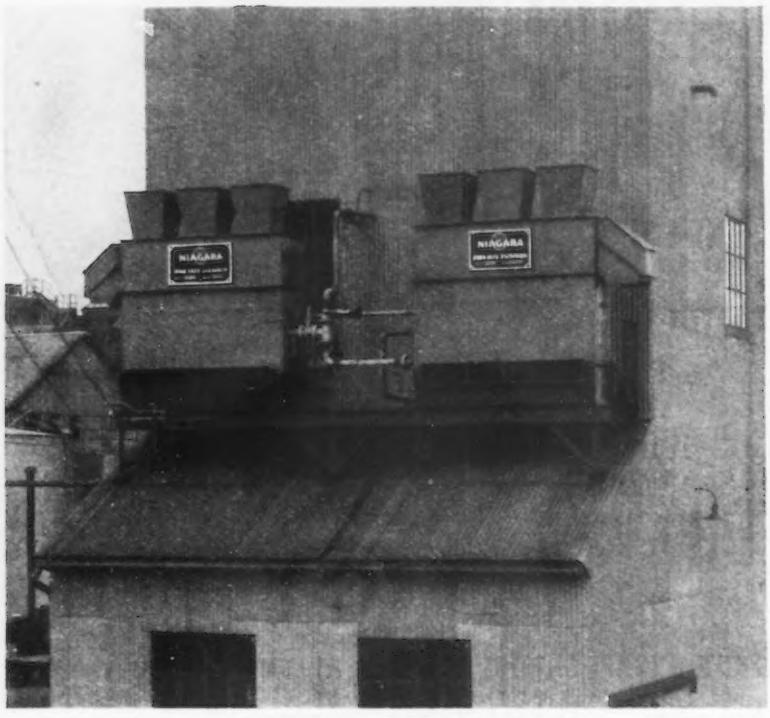

● Wherever there is a need for the use of cooling water or the cooling of any liquid to exact temperatures, the NIAGARA *AERO* HEAT EXCHANGER provides a more accurate control and lower costs for cooling. Refrigeration is not needed.

These results are advantageous in all types of water-jacketted and water-cooled equipment; for example, they have solved for many the troubles coming from excess water and oil in air compressor lines. Other uses include the cooling of diesel engines and hydraulic equipment; also chemicals and intermediates requiring cooling or controlling temperatures in chemical processes.

In addition, wherever used, it saves practically all the expense of cooling water and the cost of piping, pumping and extra equipment. Users have cut such costs as much as 95%.

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Critical Listing Urged For Tool, Die Makers

Washington

• • • **Unless the Interagency** Committee or some other policy-making head demands soon that the tool and die industry be placed and recognized as one of the most vital in the critical industry list, mass production cannot help but suffer greatly, the Costello draft deferment subcommittee of the House Military Affairs Committee has been told by M. W. Rowell, general manager of the National Tool and Die Manufacturers Association. Mr. Rowell said that vital war production is now being faced with a cut of 30 to 50 per cent because of the present policy of inducting skilled tool and die makers. He declared that the principal trouble is that local draft boards are not properly instructed.

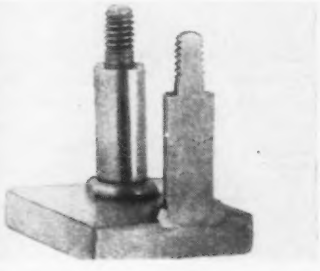
Mr. Rowell denounced a statement before the subcommittee by War Manpower Commissioner Paul V. McNutt, who said WMC has been able to solve war manpower up to the present. The fact is, said Mr. Rowell, that the indefinite and confused operations under the direction of Mr. McNutt have done far more harm than good.

UPSIDE DOWN? *This photo is not upside down, but shows Trixie Firschke of the 1944 Ice-Capades suspended from a magnet. Dings Magnetic Separator Co. staged this publicity stunt at its Milwaukee plant.*

Welds in less than 1/2 second with this proven stud welding process!

The Nelson Stud Welder gives you a dependable means of end-welding studs to metal surfaces—saves your time, material, and labor!

FIVE years of successful operation has proven the Nelson stud welding process to be a simple, flexible means of end-welding studs to metal surfaces. By its automatic performance an operator can make from 500 to 1,000 welds on a shift —today over 200 industrial plants are using it to help solve production and design problems. Here's how it works . . .



Complete fusion of the stud to metal *(as illustrated)* is the result of the use of Nelson "flux-filled" studs and a patented porcelain ferrule which gives a full shielding of the arc. The strength of the weld is in the strength of the stud—as the stud will break before the weld.

Studs up to 5/16" in diameter can be welded on 16-gauge plate . . . studs up to 1/2" diameter welded on 10-gauge plate.

Flux-filled studs are patented by Nelson. Their unusual construction produces a stable arc that is both concentrated and consistently hot. A patented porcelain ferrule keeps the arc concentrated within the weld area, excluding oxygen, etc., from the molten metal and forms a mold to hold the weld material in position.

The Nelson Stud Welder is fully automatic in operation. The stud is placed in the chuck, the ferrule is placed over its end and the unit contacted with the metal. The operator pulls the trigger which causes the stud to lift a predetermined distance establishing an arc from the stud to the plate. At the end of a predetermined time the gun trips automatically forcing the stud into the molten puddle of metal and the operator is now ready to make the next weld.

With a rag impregnated plastic body the welder weighs only 5 lbs. and is strong and sturdy in construction.

How Others Use Nelson Studs

Installing electric wiring conduits and hangers • Securing all types of insulation materials • Securing machinery of all types • Securing parts to steel castings of all types • Any task calling for end-welding of studs to metal.

Types of Nelson Studs

Shoulder Studs

Shoulder studs in overall lengths of 1" to 8", and 7/16" and 1/2" in diameter. Threaded extension diameters of 1/4", 5/16" and 3/8" with lengths of 1/2" to 1".

Straight Studs

Straight studs in lengths of 1" to 8", and in diameters of 1/4", 5/16", 7/16" and 1/2". Maximum thread length is 1¼".

Drive-in Studs

A drive-in screw is manufactured with a 1½" diameter washer attached. This is used with a female stud, the drive-in screw being driven in after the stud is in place. This type of stud can be used also to secure insulation materials of all types.

Many other types and styles are available for special installations. Let us know your stud welding problems and permit us to advise you . . .

For samples, complete details and catalog, write to:

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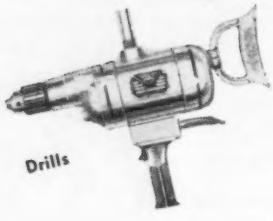
Dept. I, 440 Peralta Ave., San Leandro, Calif.

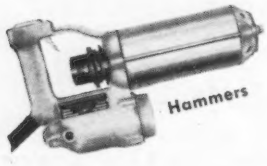
Eastern Representative: Camden Stud Welding Corp., Camden, N. J.

NELSON STUD WELDERS & STUDS



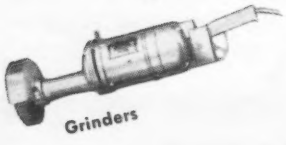
At work on many a weapon of war, Millers Falls electric tools keep firing steadily, day after day, night after night.

Take, for example, the Dyno-Mite Electric Screw Driver and Nut Runner. So light, and small, that it may easily be handled by a woman, yet it packs plenty of power. Special feature is its Adjustomatic clutch which disengages when pre-selected screw or nut tension is reached. Easily controlled with one hand.



Then there's our full line of portable electric drills, sanders, grinders, hammers, screw drivers and nut runners — every one a well-balanced instrument.

Let one of our production engineers survey your problems and make recommendations. Of course, there's no obligation.



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MILLERS FALLS TOOLS
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Use of Women Studied By Steel Industry

• • • **Women's place** in the postwar steel industry has been analyzed and facts presented by the Women's Bureau of the U. S. Department of Labor, in a booklet titled "Women's Employment in the Making of Steel, 1943." Laboratories, and the maintenance, service and clerical divisions of steel companies have been found to offer the most in possibilities for the effective utilization of women. The electrical repair shop has been considered one of the most satisfac-factory and effective spots to employ them, the report says.

The table below, taken from the report, shows how women have been utilized in various departments of a huge steel corporation. As can be seen, the ore docks, receiving and storage yards, coke and by-products plants, blast furnaces and the steel furnaces are an extremely limited field.

Per Cent Distribution by Department of 8,222 Women Plant Employees in 17 Plants of a Steel Corporation

Department	*Per cent of women*
All departments (8222 women)	100.0
Ore docks	0.8
Coke and by-products	2.6
Blast furnaces	4.5
Steel works	5.0
Rolling mills	39.8
Bar and rod	5.9
Bloom and billet	9.5
Plate	7.4
Sheet-tin plate and strip	9.1
Slab	0.8
Structural	3.9
Rail	1.2
Other and not specified	1.9
Other finishing and fabricating depts.	9.0
Laboratory and quality-control	13.9
Power and fuel	1.4
Shipping and warehouse	1.1
Maintenance and service	19.8
Shop maintenance	14.4
Brickyard and masonry	1.3
Yard, track and transportation	2.6
Plant protection	0.9
Construction	0.2
General	0.4
Clerical, engineering and accounting	1.2
Department not specified—labor	0.9

Pullmans-Standard Describes Welding Methods

• • • **Application of arc welding,** spot welding and flame welding to railroad and ordnance items are described in considerable detail in the March issue of "The Carbuilder," published by the Pullman-Standard Car Mfg. Co., Chicago. In this welding issue of its house organ, Pullman-Standard traces the application of welding in its shops since 1911 and illustrates with a host of photographs typical welded freight and passenger cars and the equipment used to fabricate them. In a section on welding of war material, considerable space is devoted to the subject of welding M-4 combat tanks.

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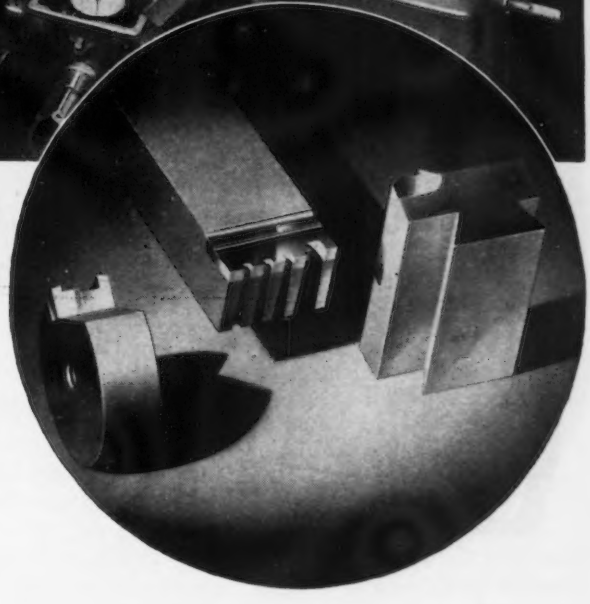
LAYOUT 50 TIMES THE SIZE OF PROFILE TO BE GROUND
50 TO 1 PANTOGRAPH
30 POWER MICROSCOPE
CROSS HAIRS OF MICROSCOPE FOCUS ON WORK AND GRINDING WHEEL. INTERSECTION OF CROSS HAIRS CORRESPOND TO THE POSITION OF THE POINTER ON 50 TIMES SIZE LAYOUT.



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● Accuracy is held to within ± .0005". This accuracy is not affected by wheel wear and no special shapes or radius dresser need be used.

● Finished parts can be checked against the layout without removal from the machine. Reversing the operations followed in grinding, layouts can be made of parts having previously undetermined profiles.

Literature Containing Full Information Is Yours for the Asking

THE Wickman CORPORATION

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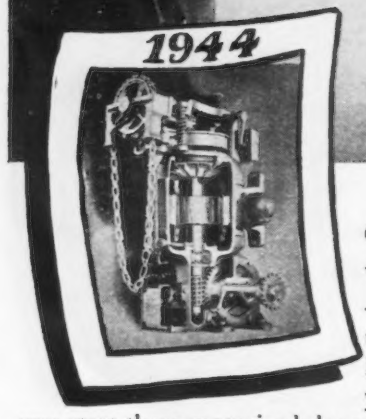

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Your doors *are* up to date if they're Kinnears — but are you getting all the added advantages of *Kinnear Motor Operation?* If not, look at the extra convenience and economy you can gain! By simply pressing a button you start these motorized doors up or down *instantly!* This quick, easy door control saves time and labor. Operation becomes so simple doors are not neglected — heating and air conditioning costs are greatly reduced. Motor operation also means *smoother* operation; doors are stopped automatically at top and bottom of the opening without slamming or rebound, reducing possibility of damage. And motor operation permits remote control; doors may be controlled from several advantageous points, and any number of doors may be controlled from a single point! Write today for further details on Kinnear Motor-Operated Rolling Doors! The Kinnear Mfg. Co., 1760-80 Fields Avenue, Columbus 16, Ohio.

SAVING WAYS IN DOORWAYS

KINNEAR ROLLING DOORS

Seized Patents Show More New Metal Working Equipment

• • • This is another list of seized enemy patents, available on license from the Alien Property Custodian. These patents are grouped in classes. Sub-class numbers are shown first in parentheses, followed by the patent number, description of the patent, the inventor's name and nationality, and the date of issuance.

This series began in the Nov. 4 issue of THE IRON AGE, page 95, at which time procedures for obtaining the patents for use were described with information concerning their usage and possibilities. Seized patent applications were shown in THE IRON AGE on July 8.

Class 29—Metal Working (Continued)

(84) 1,907,561. Method of assembling on a shaft a laminated dove-tail recessed commutator ring insulated between two correspondingly dove-tailed clamping rings. Alfred Oldenburg, Germany. 5-9-33.

(84) 1,912,731. Method and means for manufacturing mirror-equipped wheels for optical purposes for cinematographic, television, and similar work. Fritz Schroter, Germany. 6-6-33.

(84) 2,017,772. Ball and roller bearing cage made of plastic. Georg Schildgen and Georg Wehr. 10-15-35.

(84) 2,105,080. Method of erecting a collapsible gasholder whose shell is composed of a series of convolutions of diminishing average diameter from the bottom toward the top. Konrad Jagschitz, Germany. 1-11-38.

(84) 2,176,816. Process for the manufacture of packing, cylinder lining or the like, in which a graphite carbon inner ring is yieldably held under compression at working temperatures by means of an undivided metal jacket ring. Gustav Huhn, Germany. 10-17-39.

(85) 2,037,223. Tongs for removing and putting in place the key rings of typewriting machines and the like. Otto Fischer, Germany. 4-14-36.

(85) 2,096,345. A device for stripping sheaves, ballbearings, fly-wheels and the like from the shafts on which they are mounted. Albert Schrem, Germany. 10-19-37.

(86.40) 1,913,426. Closing band for piston rings so constructed that the closing can be effected without special closing device in that teeth are stamped out of the band in such manner that when placing the band around the piston rings, the closure is caused by the interengagement of the teeth. Kurt Bley, Germany. 6-13-33.

(87.10) 1,890,415. Device for stressing springs employed for fixing railway rails on their support. Max Ruping, Germany. 12-6-32.

(88) 1,634,906. Method and apparatus for making lantern wheels for clocks and other purposes. Herbert Kienzle, Germany. 7-5-27.

(88.20) 1,748,765. Method of applying a flexible tubular collar to an electrical conductor to surround the same with permanent tension. Paul Friedrich Hellermann, Germany. 2-25-30.

(88.20) 1,955,048. Device for inserting the piston pin in the piston and piston rod. Kurt Bley, Germany. 4-17-34.

(90) 1,945,935. Apparatus and method for forming embossing cylinders used for embossing films of the goffered type used in the Berthon process of color photography. Fritz Fischer, Germany. 2-6-34.

(90.50) 2,125,825. Method of condensing and smoothing sectional metal, particularly rods or rings of square or hexagonal section. Conrad Thyssen, Germany. 8-2-38.

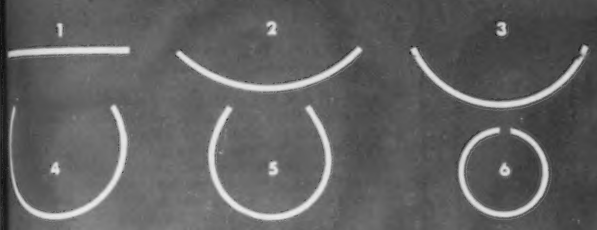
(95) 1,707,279. Method of trimming the surface of metallic stock. Valentin Retterath, Germany. 4-2-29.

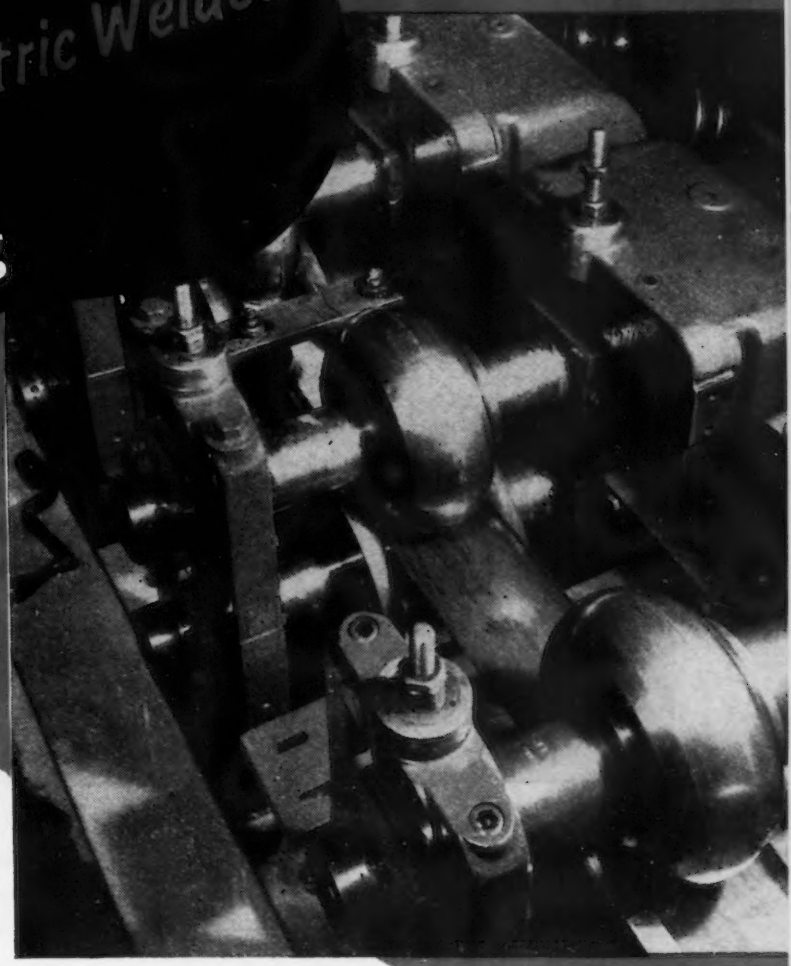
(95) 1,756,516. Metal cutting tool such as is used for planing, turning, or finishing blanks. Hans Klopstock, Germany. 4-29-30.

(95) 1,956,233. Insert to be interposed between the shank and tip of a composite tool or implement in soldering them together. Richard Braun, Germany. 4-24-34.

(95) 2,124,438. Article or machine part having two parts of widely different coefficients of expansion soldered together. Wil-

No Strain in Forming Talon's Electric Welded Steel Tubing





These forming rolls shape the flat, strip steel into easy-to-fabricate Talon's Electric Welded Steel Tubing.

Flat, accurately trimmed, carefully selected strip steel passes through this series of eleven sets of forming rolls and is formed progressively into round tubing. Properly engineered pass design prevents overstraining and resultant injurious stresses.

Then the material moves into position under the welding unit and the two edges are joined by electric resistance welding. Subsequent operations include bright annealing (when application demands this quality), straightening, cutting to length, EXACTING TESTING, careful inspection, and proper preparation for shipment to your plant.

Facts About Easy-to-Fabricate Talon's Tubing

You can fabricate Talon's Tubing by all the standard methods. The section can be changed by beading, flanging, swaging, bending, etc., to meet an endless variety of design requirements.

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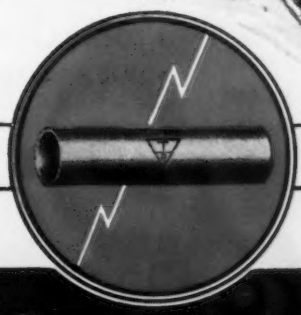
If you plan to use Steel Tubing for your wartime or your peacetime product, you'll find Talon's Tubing easy to fabricate.

Hundreds of miles of Talon's Tubing have been used for the "invasion lines" to carry gasoline, oil, and water to our mechanized forces in the combat areas. Lightweight for ease and speed of placement in the field, great strength and flexibility to withstand the shocks of bombing and shell fire, were the requirements.



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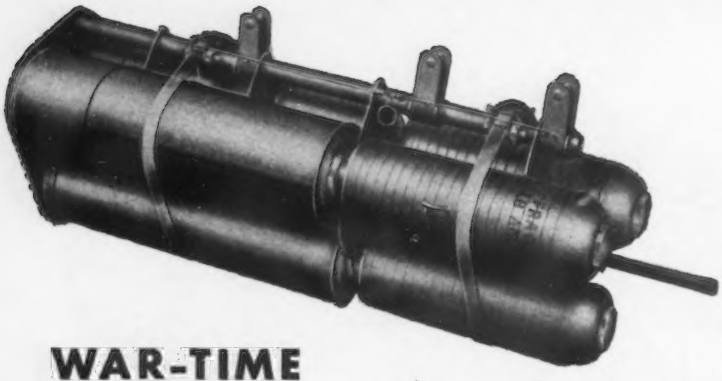

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*In one package . . . in one service . . . we take over ALL responsibility—acting as YOUR Factory, from Design Research to Drop Shipments.

helm Struk and Hubert Schroeder, Germany 7-19-38.

(95) 2,251,007. Machining tool intended for machining insulating material. Karl Schroter and Walther Dawihl, Germany. 7-29-41.

(95) 2,256,847. Tool for cutting, milling, drilling, grinding or the like made from ceramic material. Werner Osenberg, Germany. 9-23-41.

(98) 2,065,966. Elastic holder for cutting-off tools and the like. Paul Bruning, Germany. 12-29-36.

(99) 2,078,820. Adjustable tool holder for tools with welded-on hard metal plates. Albert Viehweger, Germany. 4-27-37.

(100) 2,238,675. Adjustable tool holder with a pivot for carrying the head of the elastic tool holder. Robert Breuning, Germany. 4-15-41.

(103) 2,053,392. Rotary tool having cutting teeth the backs of which conform to the surface generated by moving the generator profile with a combined movement of rotation about the tool axis and of radial translation. Mario Challier, Italy. 9-8-36.

(103) 2,111,887. Rotary cutting tool. Mario Challier, Italy. 3-22-38.

(104) 1,898,732. Milling cutter for dovetailed grooves. Gustav Krohne, Germany. 2-21-33.

(105) 1,676,719. Milling cutter composed of individual disks and with which the conditions are so chosen that by altering the mutual arrangement of the disks by turning them the cutting teeth arranged along quick motion helical lines inclined to one side, as well as those arranged along as helical line inclined to the other side may be brought into common ranks or lines. Otto von Eberhard, Germany. 7-10-28.

(105) 1,755,717. Saw having teeth consisting of separate pieces attached to the saw, said teeth having their cutting edges interrupted by grooves to permit removal of the shavings coming from the side surfaces of the cut in the work piece in inward direction of the saw. Karl Wagner, Germany. 4-22-30.

(148) 1,699,205. Process of producing metal powder particles constituting hollow spheres. Emil Podszus, and Erwin Kramer, Germany. 1-15-29.

(148) 1,718,899. Method of uniting radio active material with a metallic carrier. Alois Fischer, Austria. 6-25-29.

(148) 1,894,389. Method of finishing and securing the ends of wire ropes. Georg Zapf, Germany. 1-17-33.

(148) 1,906,782. Method for reducing the extension in wire ropes. Georg Zapf, Germany. 5-2-33.

(148) 2,008,626. Method for manufacturing metallic materials by rotating rolls or wheels containing a molten metal between them. Yoshimichi Murakami, Japan. 7-16-35.

(148.20) 1,900,988. Tank or vessel which is adapted to contain fluids and which is subjected in use to high pressures and high temperatures. Fritz Gorschlueter and Ernst Pohl, Germany. 3-14-33.

(148) 1,945,302. Process for manufacturing an elongated metallic element having an enlarged head with a covering of a different metal. Albino Zanzi, Italy. 1-30-34.

(148) 2,042,018. Method of producing mirror wheels such as are used for dissolving or gathering pictures in the television art. Hermann Papst, Germany. 5-26-36.

(148) 2,156,439. Aluminum disk suitable for use in manufacturing circular articles. Kenjiro Takeda, Japan. 5-2-39.

(148) 2,257,535. Method of working thermally hardenable beryllium-containing alloys. Wilhelm Rohn, Werner Hessenbruch and Willy Hellwig, Germany. 9-30-41.

(148) 2,260,779. Method and manufacture of ferroconcrete reinforcing elements. Ernst Hoffmann, Germany. 10-28-41.

(148.2) 2,120,881. Process for the manufacture of thin walled, hollow annular sheet metal molds for use in the vulcanization of tires and the like. Heinz Assbroicher and Karl Huff, Germany. 6-14-38.

(148.20) 1,939,552. Insulated conducting wire. Eugen Hepner, and Hans Meurer, Germany. 12-12-33.

(155) 1,689,678. Method of constructing a metal pile having a full wave cross-section. Arthur Mauterer, Germany. 10-30-28.

(155) 1,735,776. Method of producing clamping plates for girder constructions. Oscar Melaun, Germany. 11-12-29.

(155) 1,988,864. Method of producing integral double-boomed sheet piles having interengaging integral elements. Heinrich Berve, Germany. 1-22-35.

(155) 2,093,208. Method of producing units of sheet piling with non-uniform flanges from sheets of metal strengthened by elements of rolled section. Karl Nolte, Germany. 9-14-37.

(155) 2,244,847. Method of making a series of similarly shaped structural elements adapted to occupy spaced positions in a constructional

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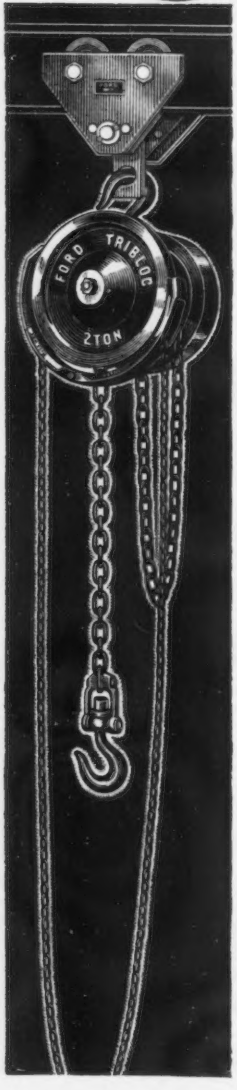

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assembly, such as airplane bodies and wings. Otto Oeckl and Emil Kolland, Germany. 6-10-41.

(155.50) 1,932,627. Method of producing guide disks for radio direction finder compensating mechanisms. August Leib, Germany. 10-31-33.

(155.55) 2,154,288. Process for making electrical contacts from a powdered refractory material having a high melting point and a metal having a lower melting point. Paul Scholz, Germany. 4-11-39.

(156) 1,685,402. Process for manufacture of seamless conduits for very high working pressures, of up to 100 atmospheres and more, like turbine conduits. J. Grossweischede and G. Reichenbecher, Germany. 9-25-28.

(156) 1,956,618. Method for manufacturing rings, particularly wheel rims by means of a die with a matrix, in a single operation. Eugen Kamp, Germany. 5-1-34.

(156) 2,002,415. Method of producing seamless tubes and other tubular articles; in extension of the method sheet plates also can be produced out of the tubes. Peter Otto, Germany. 5-21-35.

(156) 2,058,007. Process of producing metallic rings of relatively large axial width and relatively small radial thickness. Hans Edelmeier, Germany. 10-20-36.

(156) 2,169,947. Absorbent wadding, particularly for surgical purposes. Hans Freudenberg, Germany. 8-15-39.

(156.40) 2,118,317. Method of manufacturing engine cylinder liners. Otto Mader, Germany. 5-24-38.

(156.62) 1,666,343. Method of manufacturing piston rings exerting equally distributed pressure against the wall of the engine cylinders. Masatosi Okochi and Keikichi Ebihara, Japan. 4-17-28.

(156.63) 1,705,643 Method of manufacturing discontinuous metallic packing rings adapted to form a tight joint. Masatosi Okochi and Keikichi Ebihara, Japan. 3-19-29.

(156.63) 1,849,467. Process for making piston rings for cylinders of known diameter. M. Okochi and K. Ebihara, Japan. 3-15-32.

(156.63) 2,171,831. Method of manufacturing piston rings operative on every part of the inner surface of the cylinder with balanced compression. T. Hiromi, Japan. 9-5-39.

(156.70) 1,904,430. Process for manufacturing valves for internal combustion engines. A. Ferrando and A. Zanzi. 4-18-33.

(156.80) 2,038,670. Method of fixing turbine blades in place. Walter Noack, Switzerland. 4-28-36.

(157) 1,941,094. Method of shaping, from a tubular blank, a hollow metal body having a plurality of angularly disposed limbs. A. Kosik, Germany. 12-26-33.

(157.4) 2,151,540. Tubular heat exchange body adapted for use in connection with smoke tube boilers. Alexander Varga. 3-21-39.

(157.10) 2,122,957. Method of manufacturing valve bodies. A. E. Santamaria, Italy. 7-5-38.

(157.40) 1,913,417. Method for manufacturing undulated tubes for sectional boiler chambers. Max Ulrich, Germany. 6-13-33.

(157.60) 2,077,641. Process for connecting pipes. Richard Niederstrasser, Germany. 4-20-37.

(159.1) 2,050,641. Process for producing corrugated disc wheels. Moritz Winkler, Germany. 8-11-36.

(160.40) 2,115,893. Method of coring, dividing, and condensing ingots of cruciform cross-section. I. Urbaniak, Germany. 5-3-38.

(160.60) 1,682,074. Method for the manufacture of snappers for snap rings. B. Forster, Germany. 8-28-28.

(160.60) 1,856,952. Process for working guide sleeves for spring rings. B. Forster, Germany. 5-3-32.

(163.50) 2,169,537. Method of producing thin sheets of metal provided with uniform holes of small diameter. B. Wempe, Germany. 8-15-39.

(163.50) 2,266,349. Method of producing holes in thin sheets of metal or glass. B. Wempe, Germany. 12-16-41.

(168) 2,190,125. Method and device for producing wear-resistant surface layers on wheels for rail-vehicles. G. Sembdner, Germany. 2-13-40.

(169) 2,061,861. Process for the production of iron sleepers having ribbed plates or ribbed reinforcements. C. Wallmann, J. Grossweischede and B. Kruse, Germany. 11-24-36.

(84) 1,743,031. Method of manufacturing multi-cylinder internal combustion engines. Jeno Fejes, Hungary. 1-7-30.

(170) 1,848,786. Method of producing lacquered spinning bobbins. Hugo Lampart, Germany. 3-8-32.

(170) 2,006,281. Method of uniting the flange ends and tubular bodies of film bobbins. Philipp Schwarz, Germany. 6-25-35.

(170) 2,052,773. Process for fabricating

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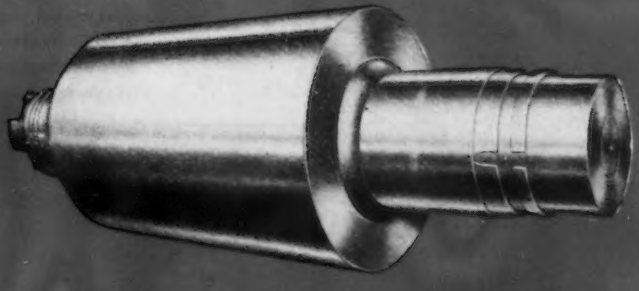

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metal bobbins for automatic looms. Helmut Junghans, Germany. 9-1-36.

(173) **2,002,399.** Method of making a wire spring including bending the wire laterally into sinuous form and longitudinally to give it a permanent set in a position of greater curvature than it assumes when in use. Karl Kaden, Germany. 5-21-35.

(180) **2,109,487.** Process for making white opaque enamel for sheet iron. Ignaz Kreidl, Austria. 3-1-38.

(181) **1,904,241.** Rolled compound metal stock. Erwin Kammerer Germany. 4-18-33.

(181) **1,927,945.** Corrosion-resistant age-hardenable aluminum composite metal. Karl Meissner, Germany. 9-26-33.

(181) **1,949,112.** Riveted plated aluminum article. Gustav Schreiber, Germany. 2-27-34.

(181) **2,106,259.** Composite aluminum article having high tensile strength and high corrosion resistance. Otto Stockmar, Germany. 1-25-38.

(181) **2,208,186.** Veneer plate of aluminum alloy. I. Igarashi and S. Higashio, Japan. 7-16-40.

(182) **2,016,674.** Process for making centrifugal cast iron pipe having two different mutually welded layers and made directly into a finished product free from any chilled effects. M. Hamasumi, Japan. 10-8-35.

(188) **2,148,040.** Method of manufacturing material consisting of at least two substances different in melting point. Paul Schwarzkopf, Austria. 2-21-39.

(188) **2,267,665.** Method of plating tubes, wires, rods and the like. Ulrich Raydt and Karl Staubwasser, Germany. 12-23-41.

(189) **1,667,787.** Method of applying a plating of aluminum to iron and steel sheets and bands. Oliver Jaeger and Ernst Lueth, Germany. 5-1-28.

(189) **1,679,308.** Method of coating metal plates with aluminum. Franz Jordan, Germany. 7-31-28.

(189) **1,985,784.** Process for the production of aluminum-plated zinc sheet. Franz Jordan, Germany. 12-25-34.

(189) **1,991,994.** Method of plating iron with aluminum. Anton Wimmer, Germany. 2-19-35.

(189) **2,064,684.** Method of plating sheet metal. Peter Ostendorf, Austria. 12-15-36.

(189) **2,096,924.** Composite structural product and method for making same. Paul Schwarzkopf, Austria. 10-26-37.

(189) **2,177,572.** Process of producing seamless projection surfaces. Gustav Kogel, Germany. 10-24-39.

(189) **2,199,321.** Method of producing plated metal sheets. Peter Ostendorf, Germany. 4-30-40.

(1.3) **2,028,996.** Method of making cartridge cases. Emile Sautier, France. 1-28-36.

(1.3) **2,183,637.** Method of forming a metallic case, like a cartridge case, from a solid piece of metal by reverse extrusion. Oreste Bibinelli, France. 12-19-39.

(1.31) **2,089,912.** Apparatus for making metal cases from tubular pieces. Oreste Biginelli, France. 8-10-37.

(9) **1,691,534.** Machine for the manufacture of fishhooks. Mathias Topp, Norway. 11-13-28.

(9) **1,792,556.** Machine for the manufacture of fishhooks. Mathias Topp, Norway. 2-17-31.

(9) **1,892,120.** Machine for making fishhooks. Mathias Topp, Norway. 12-27-32.

(28) **2,076,773.** Machine for working copper cylinders in copperplate printing machines. Francois Goyot, France. 4-13-37.

(33) **1,633,714.** Automatic and universal machine tool, suitable for small shop work and for working of pieces necessitating a medium stroke of the tool. Alexandre Schwob, France. 6-28-27.

(33) **1,744,809.** Device for shaping to be used in a universal and automatic machine tool. Marcel Schwob and Alexandre Schwob, France. 1-28-30.

(34) **2,029,797.** Apparatus for the manufacture of cups from which cartridge cases can be cold drawn. Emile Sautier, France. 2-4-36.

(43) **1,961,868.** Means for the automatic manufacture of threaded nuts. Rolf Staubo, Norway. 6-5-34.

(56) **1,644,566.** Turret lathe in which the various sets of tools adapted to operate on the different bars are mounted on a single tool-carrier movable about a fixed axis from which the various sets of tools are equidistant. Georges Cuttat, France. 10-4-27.

(73) **1,651,101.** Reciprocating-saw Machine for the sawing of metals. Achille Pays, France. 11-29-27.

(73) **1,806,013.** Machine for sawing off an element such as a sheet piling under water. Jacobus deKater, Netherlands. 5-19-31.

(73) **1,810,746.** Metal sawing machine with arcuate cut. J. Babin and A. Pays, France. 6-16-31.

(76) **1,660,887.** Filing, sawing and grinding

machine principally characterized by the fact that when it is employed as a filing machine, the tool may receive simultaneously a vertical alternating movement and a continuous rotary movement. H. Romanoff, France. 2-28-28.

(81) **1,992,703.** Rotary percussive device to be used internally for cleaning and removing rust from surfaces of all kinds. T. Lechelt, Netherlands. 2-26-35.

(84) **1,736,561.** Apparatus for removing and replacing spark plugs for motor cars without having to stop the motor. A. Wattel, France. 11-19-29.

(84) **1,762,891.** Process of assembling single and double row ball bearings. Louis Rouanet, France. 6-10-30.

(84) **1,885,406.** Method of manufacturing hollow bodies having undevelopable metallic walls. Louis Bechereau, France. 11-1-32.

(84) **2,034,534.** Method and device for assembling and fitting in position the elements of needle or roller bearings. Alfred Pitner, France. 3-17-36.

(89.5) **2,313,804.** Method of grinding cooperating faces of members of electromagnets and armatures. Jean Cotal, France. 3-16-43.

(90) **1,730,942.** Tool for engraving rollers applicable for the treatment of photographic films. Andre Oswald, France. 10-8-29.

(90) **1,812,909.** Machine for mechanically burnishing and polishing silver plate. Louis Trinquet and Rene Marcel, France. 7-7-31.

(96) **1,776,335.** Tool holder with the cutting part loosely mounted between the jaws of the holder and automatically gripped by these jaws in a uniform manner. Pierre Rauzieres, France. 9-23-30.

(96) **2,171,694.** Cutting tool unit for use in lathes and similar machines. August Harje, Denmark. 9-5-39.

(103) **2,124,818.** Milling cutter with spiral lateral teeth which terminate in end cutting edges. F. Gouverneaur, France. 7-26-38.

(103) **2,297,445.** Cutting tool particularly useful in the manufacture of gears requiring highly accurate tools. Friedrich Wenzel, Germany. 9-29-42.

(148) **1,877,370.** Method of manufacturing a tubular metal article having a reduced portion adapted to be threaded internally. Albert Streit, France. 9-13-32.

(156.5) **1,854,271.** Process of manufacturing pistons. Gilbert Michel, France. 4-19-32.

(148) **2,119,088.** Method for producing flat blanks for aluminum cooking vessels. Albert Strack, France. 5-31-38.

(148) **2,122,856.** Method for manufacturing metal strapping of any shape for strapping boxes, parcels, bales, etc. Hermann Brenneisen, France. 4-5-38.

(148) **2,142,438.** Method for making metal doors. Louis Faiveley, France. 1-3-39.

(148.2) **1,966,713.** Process for the manufacture of a container from a metal having the characteristics of aluminum. Charles Flint, Denmark. 7-17-34.

(148.2) **1,994,210.** Method of connecting smooth walled closely fitting inner and outer tubular bodies accessible from one end only. J. Chobert, France. 3-12-35.

(148.2) **2,121,670.** Method of construction of a metal frame assemblage for a hollow body. Leon Saives, France. 6-21-38.

(148.2) **2,200,162.** Method of manufacturing gas bottles for relatively high pressures from a tube open at one end. V. de Vulitch, France. 5-7-40.

(148.4) **1,650,853.** Process of manufacturing cages for ball or roller bearings. Louis Rouanet, France. 11-29-27.

(148.4) **1,650,854.** Process of manufacturing cages for ball or roller bearings. Louis Rouanet, France. 11-29-27.

(148.4) **1,699,571.** Process of manufacturing one piece sheet metal cages for roller bearings. Louis Rouanet, France. 1-22-29.

(149.5) **1,732,657.** Method for the manufacture of a resilient joint, constituted by two cylinders having the same axis and a tube made of a firmly compressed resilient material between these two cylinders. Emile Picquerez, France. 10-22-29.

(149.5) **1,928,544.** Process for manufacturing an antifriction bearing bushing of an alloy containing an exudable soft substance. Alfred Ricard, France. 9-26-33.

(149.5) **1,961,304.** Method of treatment of friction pieces comprising an exuding substance. Alfred Ricard, France. 6-5-34.

(149.5) **1,971,433.** Method of applying a sheet of hard metal to cylindrical members. Eugene Tartrais, France. 8-28-34.

(149.5) **2,297,385.** Method of producing compound cast bearings. Felix Biedermann, Germany. 9-29-42.

(155) **2,201,071.** Method of producing iron girders and very large T-section iron. Justin Baugnee, Luxemburg. 5-14-40.

(156) **1,733,455.** Method of making metal pipes of large diameter adapted to withstand high internal working pressures. G. Ferrand, France. 10-29-29.

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Among the Week's Trade Notes

Cochrane Corp., Philadelphia, announces the acquisition of exclusive sales rights to the line of Rotameters manufactured and hitherto sold by Rotameters, Inc., Jenkintown, Pa.

•

Waterbury Button Co., Waterbury, Conn., has changed its name to Waterbury Companies, Inc. There have been no changes in management or policy.

•

Continental Roll & Steel Foundry Co., East Chicago, Ind., has changed its name to Continental Foundry and Machine Co. for the purpose of describing more clearly the company's productive facilities. Management, policies, personnel and products remain unchanged.

•

American Machine and Metals, Inc., East Moline, Ill., has purchased virtually the entire common stock of the United States Gauge Co., Sellersville, Pa. J. W. Place remains as president of U. S. Gauge.

•

Cutler-Hammer, Inc., Milwaukee, has established a sales office in Columbus, Ohio, to increase the availability of its equipment and service in this industrial area.

•

Norman Bel Geddes & Co., New York, has taken three new partners into the organization to meet the expanded needs for industrial design in the war and postwar economy.

•

Ampco Metals, Inc., Milwaukee, plans to erect a new plant on a newly acquired 3.5 acre site in Burbank, Cal., to replace inadequate facilities now being leased in Hollywood, Cal.

•

South Side Steel Treating Co., Inc., Milwaukee, 4709 W. Lisbon Ave., has been organized by William Pickard, George Peterson and Oliver West.

•

Curtiss-Wright Corp. Airplane Division, Buffalo, announces that its Kenmore and Airport plants have been designated as separate plants and will operate independently under different general managers. The new arrangement, it was said, will enable the company to meet increased production schedules and provide greater operating efficiency.

Sweden Shipped 34 Million Tons of Iron Ore to Germany

• • • According to British sources, since the beginning of 1940, Sweden has exported to Germany about 34,000,000 tons of iron ore. As compared with the average exports to Germany in the four year period from 1935 to 1938, there was an increase of 15 per cent in 1940; 2.5 per cent in 1941; a decrease of 4 per cent in 1942; and an increase of 15 per cent in 1943 in iron ore shipments. Total exports of iron ore from Sweden during the 1940-43 period to enemy countries other than Germany and to enemy-occupied countries were about 3,000,000 tons.

Under the 1944 Swedish-German trade agreements, Swedish exports of iron ore to Axis countries are expected to be reduced from about 10,000,000 to 7,000,000 tons.

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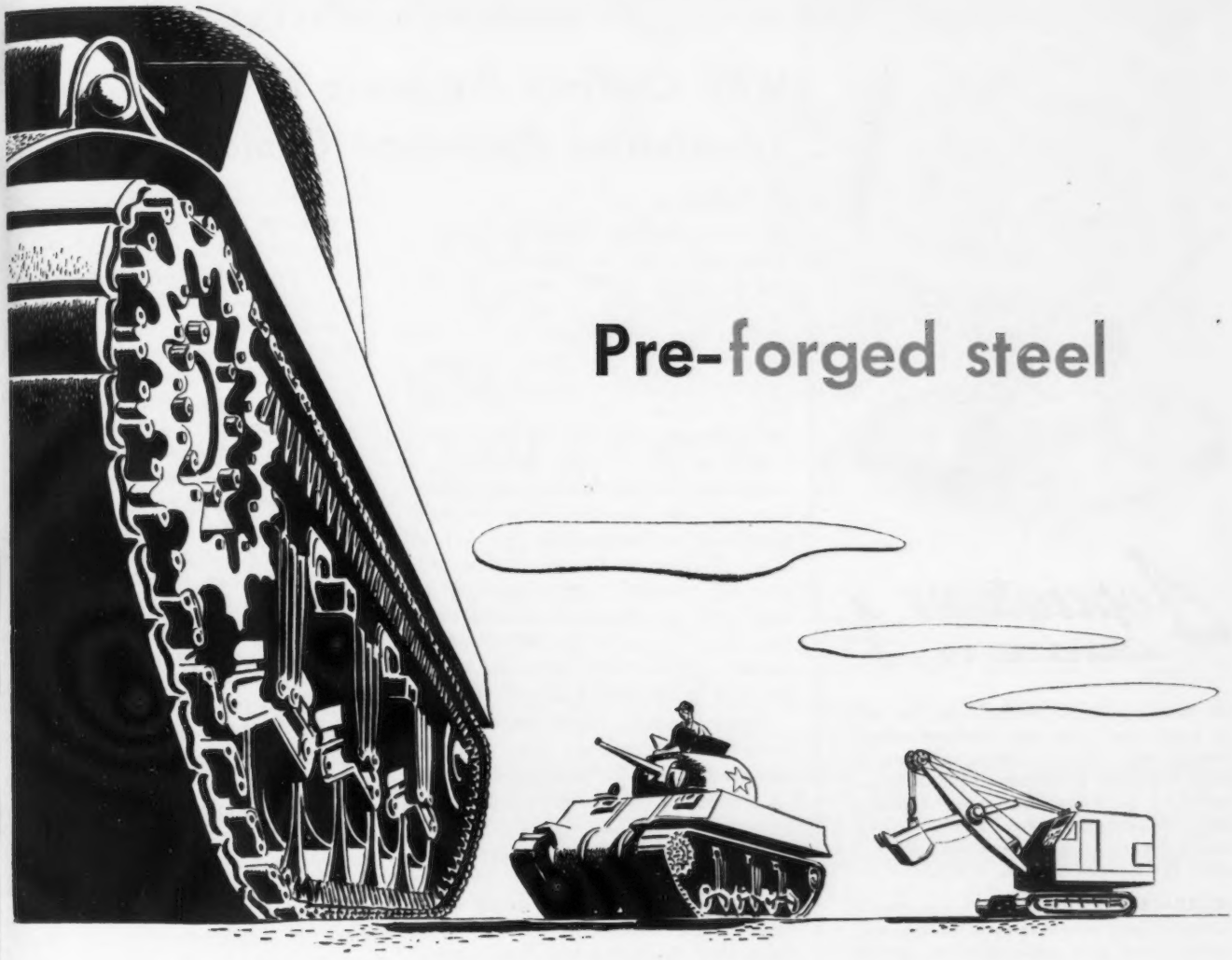

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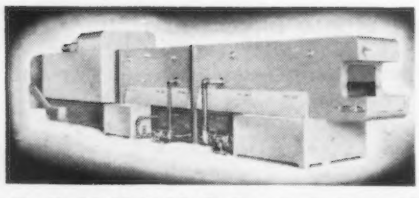
4 operations CONVERTED TO... 1

The Conveyor-Spray Machine can be used to wash, rinse, dry and rustproof miscellaneous work. This machine is composed of units, therefore, it can be expanded to suit variations in production set-ups. Starting with a Wash only, a Rinse can be added, then a Dryer and a Rustproofing unit. Any other combination of units is available.

INCREASED PRODUCTION — The special conveyors and arrangement of engineered power sprays with nozzles on top, bottom and sides give complete coverage. This—coupled with ease of inspection, loading and unloading—speeds production so that costs are cut.

LOW COST — Life of cleaning solution is extended by Duplex straining devices; man-sized doors facilitate maintenance and keep operating costs at a minimum. Send us your problems, we will test-clean your work in our laboratories and give you data on how to lower your cleaning costs. Take advantage of our complete metal cleaning engineering service.

Send your cleaning problems to:
Metal Washing Division, 510 S. Byrkit Street
Mishawaka, Indiana



CONVEYOR-SPRAY

American
FOUNDRY EQUIPMENT CO.

MISHAWAKA, INDIANA

WPB Outlines Procedure for Transferring Production Quotas

Washington

• • • **Production quotas** may not, as a general rule, be transferred from one person to another under any circumstances, except in connection with the transfer of a business as a going concern or with the express permission of the WPB. However, this general rule does not prevent the transfer of authorized production schedules, which are included in the scope of the general term "quota", in connection with the transfer of an allotment permitted by paragraph (g) (1) of CMP Regulation No. 1. If one person has several establishments, he may distribute his quota among them as he sees fit, unless his quota was acquired in connection with the transfer of a business as a going concern.

These general rules contained in priorities regulation No. 7A, as amended March 21, also indicate that no person may transfer to another a preference rating or any right granted by a specific authorization of WPB, except where such a move is part of a transfer of a going business. Such transfers must be distinguished from the use (application or extension) of preference ratings for the purpose of obtaining materials or products.

When an entire business is transferred as a going concern to a new owner who continues to operate substantially the same business in the same establishment, using substantially the same trade marks and trade names, if any, all rights and obligations under WPB orders and regulations that applied to the business before the transfer continue to apply after the transfer. The transferring owner no longer has such rights. The business, under the new ownership, has the same quotas, preference ratings, allotments, authorized production schedules, specific authorizations, and other rights and duties created under WPB orders and regulations as it had under the previous ownership. The new owner may not, however, continue to exercise any such rights if he discontinues operation of the business he acquired or operates it as a substantially different business or in another establishment, or if he uses a substantially different trade mark or trade name. He may not at any time use any part of the quota of a transferred business for any other part of his own business.

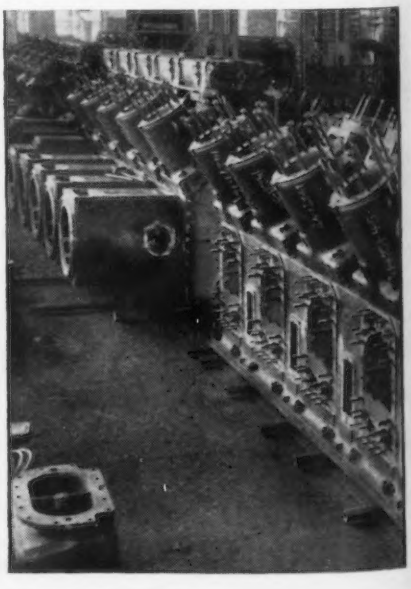
If a business is not transferred in its entirety, but is divided up in any way, application must be made to WPB for a determination of quotas and other rights and duties under WPB orders and regulations.

Priorities regulation No. 7A also indicates that WPB orders that place restrictions on the transfer of specific materials or products do not apply to transfers that are part of transfers of ownership of a business as a going concern. WPB approval need not be obtained for such a transfer of such specific materials or products.

If these rules work an exceptional hardship in any particular case, an appeal may be filed with WPB for relief. An appeal for the transfer of a quota should be filed as an appeal from the order imposing the quota by the person who wishes the quota transferred to him. If the person from whom it is to be transferred agrees to the transfer, he should join in the appeal.

The rules do not apply in any case where an applicable rule or regulation of WPB provides different rules.

COMPRESSOR ASSEMBLY: *This production line of 1000 hp. compressors at the Cooper-Bessemer Corp. plant, Mt. Vernon, Ohio, shows the progressive assembly operations from the engine frame (foreground) to the completely assembled GM-V compressor unit (background).*



Gray Iron Founders Admit New Members

Cleveland

••• Fifteen manufacturers of gray iron castings were admitted to membership in the Gray Iron Founders' Society in the past two months, W. W. Rose, executive vice-president, announced.

They are: American Saw Mill Machinery Co., Hackettstown, N. Y., W. E. Guild, general manager; Bignall Co., Medina, N. Y.; Benjamin Eastwood Co., Paterson, N. J.; Goulds Pumps, Inc., Seneca Falls, N. Y.; Keystone Foundry Co., Lebanon, Pa.; Keystone Grey-Iron Foundry Co., Pottstown, Pa.; Geo. A. Knowles Foundry, Inc., Niagara Falls; Papec Machine Co., Shortsville, N. Y.; Pen Argyl Mfg. Co., Pen Argyl, Pa.; Penebacker Co., Emmaus, Pa.; Pittston Stove Co., Pittston, Pa.; Progressive Foundry Works, Rochester, N. Y.; Sillman Hardware Mfg. Co., Trenton, N. J.; A. P. Smith Mfg. Co., East

Steel Corp. Shipments Set Record During March

••• Shipments of finished steel products by subsidiary companies of the United States Steel Corp. in March totaled 1,874,795 net tons, a new record. This compares with 1,755,772 tons in February and with 1,772,397 tons in March, 1943.

For the year 1944 to April 1, shipments were 5,361,354 net tons compared with 5,149,982 tons in the same period of 1943. The first quarter of 1944 was the highest on record.

COMING EVENTS

April 12-15 — The Electrochemical Society, Inc., Milwaukee.

April 17, 18—American Zinc Institute, Galvanizing Committee, St. Louis.

April 25-28—American Foundrymen's Association, Buffalo.

May 1, 2—Westinghouse Machine Tool Electrification Forum, Pittsburgh.

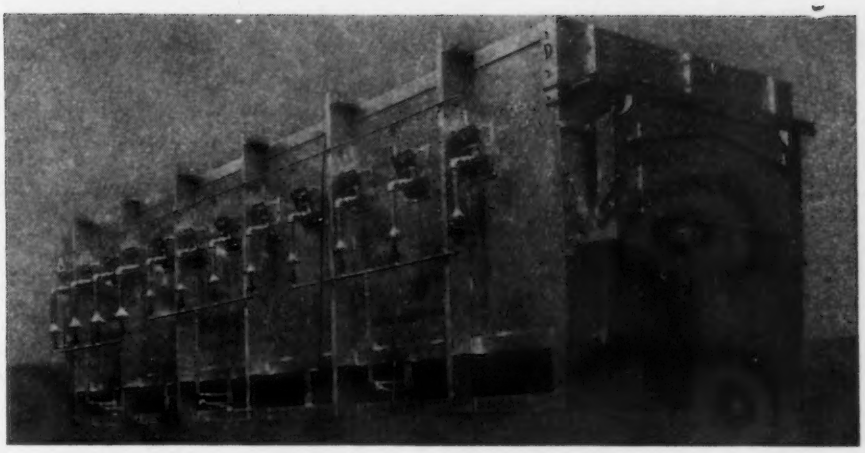
May 8—Association of Iron & Steel Engineers, spring conference, rolling mill committee, Pittsburgh.

May 9, 10—American Steel Warehouse Association, Inc., Chicago.

May 22-24—American Gear Manufacturers Association, Rye, N. Y.

May 25—American Iron and Steel Institute, New York.

June 5-7—SAE National War Materiel Meeting, Detroit.



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are designed for the job.

In the construction of Bellevue Furnaces, painstaking consideration of the job to be done comes first. Every factor must be evaluated, every condition studied. Only then do Bellevue engineers attempt design and recommendation of furnace type.

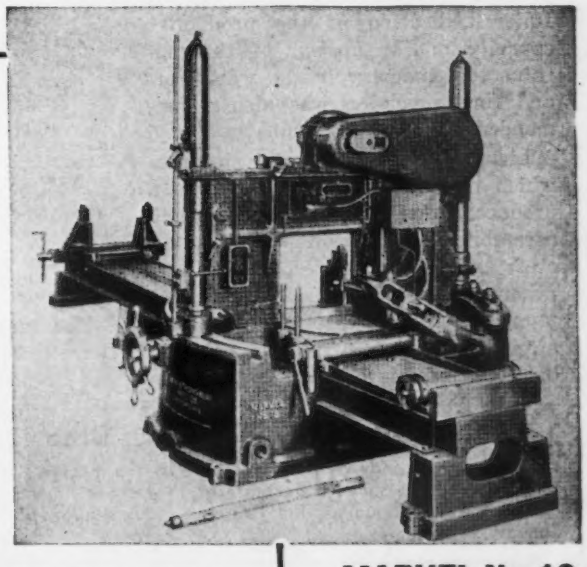
The soundness of that policy is being demonstrated in plant after plant. Hundreds of executives in scores of varied companies have proved, to their own satisfaction, the efficiency, speed, high production level and operating economies of Bellevues that were "designed" for the job.

You, too, will find Bellevue experience and facilities a profitable investment for your own furnace needs.

Send for full details.

BELLEVUE INDUSTRIAL FURNACE CO.
2974 BELLEVUE AVENUE DETROIT, MICH.

CUTS the Toughest Steels and Largest Sizes *easily*.



This giant hydraulic metal-cutting saw is more than just a larger hack saw. It is a new development in metal-cutting methods that introduces a new principle of metal sawing — the Roll-stroke blade action makes it possible to cut the toughest steels in the largest sizes easily and rapidly. It also permits a simple and efficient, very low pressure Hydraulic Feed System.

Built for heavy work, completely enclosed in heavy housing, this machine will stand up under the rough usage of the average steel mill warehouse and forge shop, where it will speed cutting-off, and reduce material loss.

MARVEL No. 18
Giant Hydraulic Hack Saw
Capacity 18"x18"
Cuts angles up to 45° by simply swiveling upper machine housing.

Write for Catalog

MARVEL SAWS

ARMSTRONG-BLUM MFG. CO.
"The Hack Saw People"
5700 Bloomingdale Ave., Chicago 39, U. S. A.

Eastern Sales Office
225 Lafayette St., New York

MACHINE TOOLS

. . . News and Market Activities

Labor Group Charts Future of Industry

Washington

• • • **The Machine Tools** Labor Advisory Committee of the WPB on April 3 announced completion of an intensive study of the two major problems which confront the machine tool industry: Full utilization of the industry's facilities to meet the changing demands of war production and utilization of the huge reserves of government-owned machine tools after the war.

The committee proposed in its report to WPB that, since the country is now tooled-up for war production, the free facilities of the machine tools industry should be shifted to the manufacture of critically needed components and the production of new tools to replace obsolete equipment in war plants, as well as factory rebuilding of machine tools. Establishment of a special management-labor committee within WPB for the purpose of recommending plans for the fuller utilization of the productive capacity and manpower of the machine tool industry in the war effort and for conversion was also recommended.

Listed among critical war products which the machine tool industry can produce were: Transmission gears and assemblies; components for landing craft and trucks; valves; fittings and other shipbuilding auxiliaries; fuel pumps, engine accessories, and other aircraft components, and internal combustion engines. The committee also maintained that the machine tool industry can be used to reduce critical shortages in other industries whose output is lagging because of inadequate equipment. As an example, the committee cited the anti-friction bearing industry, in which serious lags in production are holding up output of critical war equipment such as landing craft and heavy trucks.

Looking to the future, the committee took a stand against the postwar sale of government-owned machine tools in any manner that will enable corporations or private traders to buy in such tools for purposes of future production or for speculation at prices far below their normal value.

As a solution, the advisory committee recommended the creation of a Machine Tools Utilization Commission to establish the conditions under which industries shall be permitted to exercise options to purchase machine tools under DPC and similar contracts.

The following functions were proposed for the Machine Tool Utilization Commission:

a) Hold title to all government owned machine tools.
b) Make a complete catalog of all government owned machine tools, small tools and allied equipment.
c) After the national security needs of the Armed Services have been satisfied, make such machine tools available to individuals, private industry, publicly supported institutions, allied governments and foreign markets.

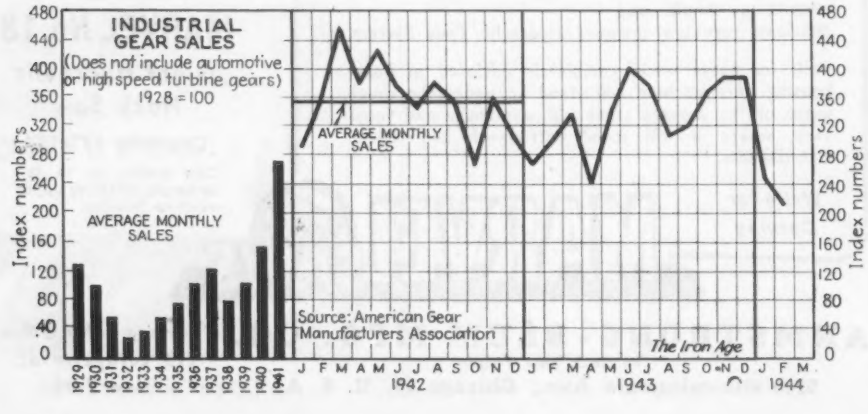
The plan is intended to facilitate the allocation of machine tools that will be necessary for the Armed Services during the post-war readjustment period and to avoid the exploitation of the tremendous investment in the basic tools of production for speculative purposes; also to assure an immediate and reasonable return to the United States Treasury.

The committee further recommended that the leasing or conditional sale of machine tools might also be used in the more complex field of lend-lease sales to allied nations. The productive capacity of many of these nations will have been almost totally destroyed by the end of the war. In addition, the simpler industrial economies of many of these nations permit the use of tools which are considered obsolete under American conditions.

The full membership of the Machine Tools Labor Advisory Committee is composed of S. W. Doerner, International Association of Machinists; James Drain, International Molders and Foundry Workers Union of North America; Frank P. Fenton, director of organization, American Federation of Labor; Harold Simon, United Electrical, Radio and Machine Workers of America, and Kenneth L. Cole, United Automobile, Aircraft and Agricultural Implement Workers of America (CIO). The government presiding officer of the committee is David Lasser, assistant director of the Plant Productivity Division of the Office of Labor Production, WPB.

February Gear Sales Drop 13 Per Cent

. . . The gearing industry as represented by the members of the American Gear Manufacturers Association shows a decrease of 13 per cent in the business booked in February, as compared with January. The February index figure was 214 as compared with 246 for January.



Tool and Die Industry To Be Hit Hard by Draft

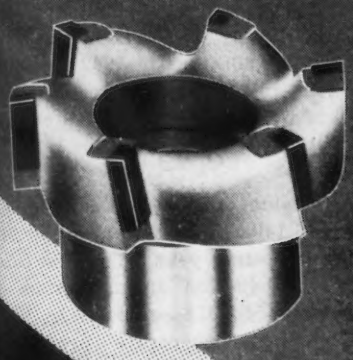
Cleveland

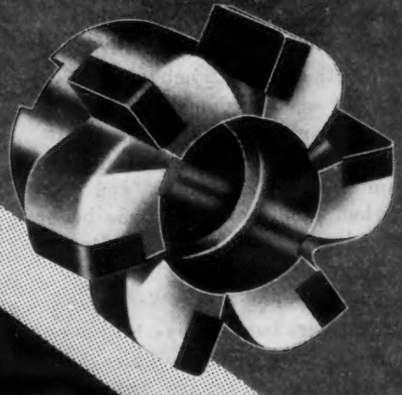
• • • **The tool and die** industry may suffer a production decline of from 30 to 50 per cent if present selective service policies continue, M. W. Rowell, general manager of the National Tool and Die Manufacturers Association, stated here April 7. Being most familiar with Chicago, Mr. Rowell said that 25 per cent of the highly skilled tool and die makers in that area were 26 years old and under and that he believed the same to be true in the Detroit and Cleveland areas.

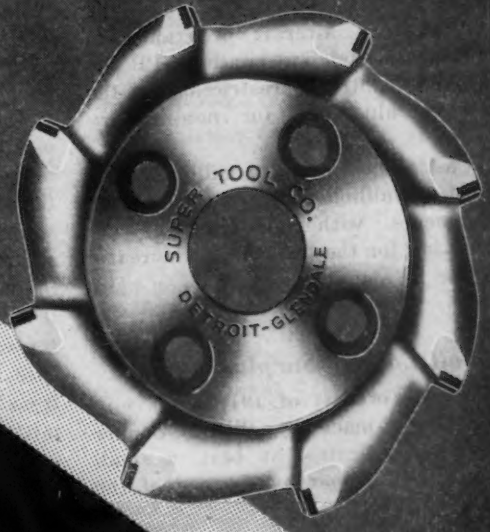
According to Rowell, the shortest time in which a skilled worker can be trained in that industry is two years and eight months. From this it is apparent that neither brief deferments nor speed-up training programs are of any apparent help. While this association official said that the industry's problem had already been put before congressional committees it was feared that a "damaging" number of men may be drafted before governmental action could intercede.

Announcing—

THE NEW SUPER STANDARD CARBIDE TIPPED SHELL END MILLS AND FACE MILLS!







Another step forward in Carbide Tipped Standardization!

•

Write TODAY for literature, prices and complete details of these Super quality, economical Carbide Tipped Cutters.

SUPER TOOL COMPANY

Carbide Tipped Tools

21650 Hoover Road, Detroit 13, Michigan

4105 San Fernando Road, Glendale 4, California

NON-FERROUS METALS

. . . News and Market Activities

Fabricated Aluminum Sets New Peak

• • • **Shipments of aluminum** fabricated products reached a new peak of 215.6 million lb. in January, 1944, 34 per cent greater than January, 1943, and about 150 per cent greater than January, 1942, according to figures just released by the Aluminum and Magnesium Division, WPB. In 1943 shipments of all aluminum fabricated products were 55 per cent higher than those in 1942.

Shipments of aluminum sheet amounted to 85 million lb. in January and showed the greatest rise of any product during the month. Shipments of sheet had declined from the October, 1943, high of 81.3 million lb. to 66.9 million at the end of the year. Shipments of sheet immediately after the U. S. entry into the war were only a little more than one-third of the present volume.

The demand for aluminum is being kept at continuously high levels by the military aircraft program and during the past few months WPB has relaxed slightly the restrictions on the use of aluminum for non-military products.

Castings exceeded 44 million lb., almost 3 million lb. above December shipments, with sand castings accounting for the bulk of this increase.

For breakdown, see tables on page 107.

Small Copper Surplus Seen

• • • **A Forecast of 1944** brass mill operations made by WPB's Copper Division indicates, at best, a small surplus of copper by the end of the year.

Requirements figures have been adjusted to represent realistic demand and mill capacities, the Copper Division said. However, copper production figures were based upon ideal operating conditions and maximum output. Therefore, in view of growing manpower shortages resulting from the military draft policy, a deficit of copper might result, officials said.

It was announced that January brass mill production figures were slightly below estimates; however, in February, production of all products except strip was at the highest level in eight months, while strip production was at the required level. Based on advance requirements, production should continue at, at least its present level for the foreseeable future.

Copper Restrictions Eased

• • • **Copper and copper base** alloys are available for parts in the manufacture of five essential items, where the use of practical substitutes could not be found, WPB announced April 4. This change was effected by amending Copper Conservation Order M-9-c.

Copper base alloy may be used in the manufacture of thermostats for poultry incubators and brooders since steel thermostats now being used corrode rapidly, often permitting the escape of ether. The amendment also permits the use of copper and copper base alloy for certain working parts in the manufacture of change-making and coin-handling machines and devices, when their production has been authorized under Limitation Order L-54-c.

The use of yellow brass scrap, one of the copper base alloys, is permitted in casting solder nipples and ferrules to replenish rapidly dwindling stocks of these items, which are essential in plumbing installations and in making repairs. The use of copper for current-carrying parts and for essential plating in the manufacture of a limited number of electric irons during the year is also permitted by the amendment.

When such manufacture is authorized by WPB brass may be used in the manufacture of specific parts for safety razors and for straight razors.

Canada Reports on Metal Output

Toronto

• • • **Canada's mineral production** in 1943 was valued at $523,940,810 compared with $566,768,672 in 1942 and $560,241,290 for 1941, W. H. Losee, chief of the Mining, Metallurgical and Chemical Branch of the Dominion Bureau of Statistics, reported at the annual meeting of the Canadian Institute of Mining and Metallurgy here. The 1943 figures were the lowest for any year since 1939, the decline caused chiefly by curtailment in gold mining operations.

The peak Canadian production of copper for all time was in 1940, when the output stood at 327,797 net tons, as against 289,491 net tons in 1943. Lead output totaled 222,177 tons last year, as compared with 256,071 tons in 1942, the latter being a record figure. Nickel set a new mark during the past year at 143,882 tons, as against 142,606 tons in 1942 and 141,129 tons in 1941. Zinc reached new heights at 304,284 tons, compared with 290,129 tons in 1942 and 256,191 tons in 1941.

Magnesium registered a very big gain at 7,149,525 lb. as against 808,718 lb. the preceding year. The first commercial production of magnesium in Canada since 1918 occurred in 1941. Molybdenite concentrate production was estimated at 407 tons last year, as against 114 tons in 1942. The mining of molybdenite ores in Canada prior to 1943 was irregular, owing chiefly to the rather erratic nature of the mineralization in the known ore deposits. Canada is one of the world's largest producers of the metals of the platinum group. They occur in association with the nickel-copper ores of the Sudbury district of Ontario. Production in 1943 was valued at $13,549,470.

• • • **Price reductions of about** $130 million on 1943 bookings were made last year by the Aluminum Co. of America, Roy A. Hunt and Arthur V. Davis, chairman reported to stockholders. Net income for the year amounted to $42,901,570 while company sales increased 67 per cent in tonnage over that of 1942. Last year's aluminum production increased 78 per cent over 1942 and aluminum in stock at the year end was 91 per cent more than at the end of 1942.

• • • **Package Machinery Co.**, Springfield, Mass., has received an order, the first of its kind, from the Marine Magnesium Products Corp., South San Francisco, Cal., for machines to wrap magnesium blocks. The machines will have a capacity of 60 blocks a min. and each block will be turned out with a printed paper label. Shipment, under high priority, will be made within 90 days.

REFINER, SMELTER PRICES

(Cents per lb. unless otherwise noted)

Aluminum, 99+%, del'd	15.00
Aluminum, No. 12 Fdy., (No. 2)	13.50
Aluminum, deoxidizing grades	12.50 to 13.75
Antimony, Asiatic, New York	Nominal
Antimony, American, f.o.b. Laredo, Tex.	14.50
Arsenic, prime white, 99%	4.00
Brass, 85-5-5-5 ingots (No. 115)	13.00
Cadmium, del'd	90.00
Cobalt, 97-99% (dollars per lb.)	$2.11
Copper, electro, Conn. Valley	12.00
Copper, electro, New York	11.75
Copper, lake	12.00
Copper, beryllium, 3.75-4.25% Be; dollars per lb. contained Be	$15.00
Gold, U. S. Treas., dollars per oz.	$35.00
Indium, 99.5%, dollars per troy oz.	$7.50
Iridium, dollars per troy oz.	$165.00
Lead, St. Louis	6.35
Lead, New York	6.50
Magnesium, 99.9+%, carlots	20.50
Magnesium, 12-in. sticks, carlots	30.00
Mercury, dollars per 76-lb. flask, f.o.b. shipping point or port of entry	$191 to $193.00
Nickel, electro	35.00
Palladium, dollars per troy oz.	$24.00
Platinum, dollars per oz.	$35.00
Silver, open market, New York, cents per oz.	44.75
Tin, Straits, New York	52.00
Zinc, East St. Louis	8.25
Zinc, New York	8.67

Copper, Copper Base Alloys

(Mill base, cents per lb.)

	Extruded Shapes	Rods	Sheets
Copper	20.87	....	20.87
Copper, H.R.	....	17.37	....
Copper, drawn	....	18.37	....
Low brass, 80%	....	20.40	20.15
High brass	....	....	19.48
Red brass, 85%	....	20.61	20.36
Naval brass	20.37	19.12	24.50
Brass, free cut	....	15.01	....
Commercial bronze, 90%	....	21.32	21.07
Commercial bronze, 95%	....	21.53	21.28
Manganese bronze	24.00	....	28.00
Phos. bronze, A, B, 5%	....	36.50	36.25
Muntz metal	20.12	18.87	22.75
Everdur, Herculoy, Olympic or equal	....	25.50	26.00
Nickel silver, 5%	....	28.75	26.50
Architect bronze	19.12	....	....

Aluminum

(Cents per lb., subject to extras on gage, size, temper, finish, factor number, etc.)

Tubing: 2 in. O.D. x 0.065 in. wall 2S, 40c. (½H); 52S, 61c. (O); 24S, 67½c. (T).

Plate: 0.250 in. and heavier; 2S and 3S, 21.2c.; 52S, 24.2c.; 61S, 22.8c.; 24S, 24.2c.

Flat Sheet: 0.188 in. thickness; 2S and 3S, 22.7c. a lb.; 52S, 26.2c.; 61S, 24.7c.; 24S, 26.7c.

2000-lb. base for tubing; 30,000-lb. base for plate, flat stock.

Extruded Shapes: "As extruded" temper; 2000-lb. base. 2S and 3S, factor No. 1 to 4, 25.5c.; 14S, factor No. 1 to 4, 35c.; 17S, factor No. 1 to 4, 31c.; 24S, factor No. 1 to 4, 34c.; 53S, factor No. 1 to 4, 28c.; 61S, factor No. 1 to 4, 28½c.

The factor is determined by dividing perimeter of shape by weight per lineal foot.

Wire Rod and Bar: Base price; 17ST and 11ST-3, screw machine stock. Rounds: ¼ in., 28½c. per lb.; ½ in., 26c.; 1 in., 24½c.; 2 in., 23c. Hexagonals: ¼ in., 34½c. per lb.; ½ in., 28½c.; 1 in., 25½c.; 2 in., 25½c. 2S, as fabricated, random or standard lengths, ¼ in., 34c. per lb.; ½ in., 25c.; 1 in., 24c.; 2 in., 23c. 24ST, rectangles and squares, random or standard lengths. 0.093-0.187 in. thick by 1.001-2.000 in. wide, 33c. per lb.; 0.751-1.500 in. thick by 2.001-4.000 in. wide, 29c.; 1.501-2.000 in. thick by 4.001-6.000 in. wide, 27½c.

Magnesium

Sheet, rod, tubes, bars, extruded shapes subject to individual quotations. Metal turnings: 100 lb. or more, 46c. a lb.; 25 to 90 lb., 56c.; less than 25 lb., 66c.

NON-FERROUS SCRAP METAL QUOTATIONS

(OPA basic maximum prices, cents per lb., f.o.b. point of shipment, subject to quality, quantity and special preparation premiums)

Copper, Copper Base Alloys

OPA Group 1

No. 1 wire, No. 1 heavy copper	9.75
No. 1 tinned copper wire, No. 1 tinned heavy copper	9.75
No. 2 wire, mixed heavy copper	8.75
Copper tuyeres	8.75
Light copper	7.75
Copper borings	9.75
No. 2 copper borings	**8.75**
Lead covered copper wire, cable	6.00*
Lead covered telephone, power cable	6.04
Insulated copper	5.10*

OPA Group 2

Bell metal	15.50
High grade bronze gears	13.25
High grade bronze solids	11.50*
Low lead bronze borings	11.50*
Babbitt lined brass bushings	13.00
High lead bronze solids	10.00*
High lead bronze borings	10.00*
Red trolley wheels	10.75
Tinny (phosphor bronze) borings	10.50
Tinny (phosphor bronze) solids	10.50
Copper-nickel solids and borings	9.25
Bronze paper mill wire cloth	9.50
Aluminum bronze solids	9.00
Soft red brass (No. 1 composition)	9.00
Soft red brass borings (No. 1)	9.00
Gilding metal turnings	8.50
Contaminated gilded metal solids	**8.50**
Unlined standard red car boxes	8.25
Lined standard red car boxes	7.75
Cocks and faucets	7.75
Mixed brass screens	7.75
Red brass breakage	7.50
Old nickel silver solids, borings	6.25
Copper lead solids, borings	6.25
Yellow brass castings	6.25

OPA Group 3

Yellow brass soft sheet clippings	8.625
Yellow rod brass turnings	8.375
Zincy bronze borings	8.00
Zincy bronze solids	8.00
Fired rifle shells	8.25
Brass pipe	7.50
Old rolled brass	7.00
Admiralty condenser tubes	7.50
Muntz metal condenser tubes	7.00
Plated brass sheet, pipe reflectors	6.50
Manganese bronze solids	7.25[1]
Manganese bronze solids	6.25[2]
Manganese bronze borings	6.50[1]
Manganese bronze borings	5.50[2]

OPA Group 4

Automobile radiators	7.00

OPA Group 5

Refinery brass	5.00*

*Price varies with analysis. [1] Lead content 0.00 to 0.40 per cent. [2] Lead content 0.41 to 1.00 per cent.

Other Copper Alloys

Briquetted Cartridge Brass Turnings	8.625
Cartridge Brass Turnings, Loose	7.875
Loose Yellow Brass Trimmings	7.875

Aluminum

Plant scrap, segregated

2S solids	9.00
All other solids	8.50
Borings and turnings	
W'rt alloys (17S, 18S, 32S, 52S)	7.50
High grade alloys	7.00
Low grade alloys	6.50

Plant scrap, mixed

All solids	7.50
Borings and turnings	5.50

Obsolete scrap

Pure cable	9.00
Old sheet and utensils	7.50
Old castings and forgings	8.00
Pistons, free of struts	8.00
Pistons, with struts	6.00
Old alloy sheet	7.00

For old castings and forgings, pistons, sheets, add ½c. lb. for lots 1000 to 19,999 lb.; for other scrap add 1c.; for lots over 19,999 lb. add 1½c. a lb.

Magnesium

Segregated plant scrap

Pure solids and all other solids, exempt	
Borings and turnings	8.00

Mixed, contaminated plant scrap

Grade 1 solids	11.00
Grade 1 borings and turnings	7.00
Grade 2 solids	9.00
Grade 2 borings and turnings	5.00

For lots over 1499 lb. add 1c. per lb.

Zinc

New zinc clippings, trimmings	7.25
Engravers', lithographers' plates	7.25
Old zinc scrap	5.75
Unsweated zinc dross	5.80
Die cast slab	5.80
New die cast scrap	4.95
Radiator grilles, old and new	4.95
Old die cast scrap	4.50

Lead

Deduct 0.55c. a lb. from refined metal basing point prices or soft and hard lead inc. cable, for f.o.b. point of shipment price.

Nickel

Ni content 98+%, Cu under ½%, 26c. per lb.; 90 to 98% Ni, 26c. per lb. contained Ni.

ELECTROPLATING ANODES AND CHEMICALS

Anodes

(Cents per lb., f.o.b. shipping point)

Copper: Cast, elliptical, 15 in. and longer	25⅛
Electrolytic, full size	22⅞
cut to size	30⅛
Rolled, oval, straight, 15 in. and longer	23¼
Curved	24¼
Brass: Cast, 82-20, elliptical, 15 in. and longer	23⅝
Zinc: Cast, 99.99, 16 in. and over	16¼
Nickel: 99% plus, cast	47
Rolled, depolarized	48
Silver: Rolled, 999 fine per Troy (1-9) oz., per oz.	58

Chemicals

(Cents per lb., delivery from New York)

Copper cyanide, tech., 100-lb. bbls. 1-5	5.65
Copper sulphate, 99.5 crystals, bbls.	13.00–13.50
Nickel salts, single, 425-lb. bbls.	34.00
Silver cyanide, 100 oz., lots	40.82–41.125
Sodium cyanide, 96% dom., 100-lb. dms.	0.15
Zinc cyanide, 100-lb. dms.	33.00
Zinc, sulphate, 89% crystals, bbls.	6.80

SCRAP

Scrap Drive May Avoid City Collections; Prices Holding Firmer

• • • **Apparently the** coming WPB drive for scrap will avoid city drives such as those sponsored in the past and concentrate its efforts on the farm areas and dormant plant scrap. The reasons for this are quite obvious. With the increasing shortage of manpower in scrap yards, the handling of poorer quality material extracted from city drives becomes almost an impossibility. Furthermore, this scrap is not the most desirable, and yards in the past have had to work much of it off by combining it with shipments of higher grade material obtained from other sources. Furthermore, the two or three city drives of the past have pretty well cleaned out the cellars and attics of the city dwellers and there has been no chance for further acccumulation.

Several scrap yards have already gone on record as stating that they would not contribute any money toward any future scrap drives in the city and some have stated they would not accept the collections of city drives as they are too hard to handle and mills do not want such scrap.

In spite of the shortages of scrap that are predicted for the coming year, there is apparently no acute shortage of any grade evidenced this week except cast scrap. Even the heavy melting grades seem in sufficient supply to meet immediate demands. This condition, however, can change overnight, and there is also the likelihood that if better quality and greater quantities of the heavier open hearth grades were available, some of the lighter grades would be less in demand than they are.

Scrap interests in the Cleveland area indicate that while heavy melting scrap may be termed scarce, there is definitely no shortage and none can be foreseen. There has been enough to meet all demands at that point and the bulk of the traffic has been to Youngstown, Warren, Farrell, and Pittsburgh. Short shoveling turnings sold in Cleveland during the past week without any springboard, commission, or switching charges. Some alloy and low phos contracts are being cancelled here.

At another major scrap consuming point, one large consumer is demanding a cut of 25c. per ton plus elimination of broker's fee of 50c. per ton on machine shop turnings. This was also attempted at another point within the past two weeks. However, no offers at this price are known, and dealers are irked by this attempt to buy below ceiling prices in the face of WPB scarcity warnings.

The growing shortage of scrap yard labor has had and will continue to have a bad effect on the movement of scrap. Yards find it practically impossible to handle any scrap that needs much in the way of preparation, and consequently are always on the lookout for such material as will not need much in the way of preparation.

Another deterring factor to scrap movement was evidenced this week in the southern Ohio area. Transportation facilities are hampering the flow of agricultural scrap into that market.

PITTSBURGH — Even though scrap buyers and sellers here concede the possibility of a much tighter market over the coming months, there are no tight spots at the present time. Some sources believe that the drop shown in official inventory figures is partly the result of some scrap users keeping close watch and control over the size of their supplies. There is probably more inventory control on scrap today than was the case six months ago.

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CLEVELAND—Small local sales have been noted locally for both blast furnace and open hearth grades. Heavy melting while generally scarce is definitely meeting the demand and cannot be termed a shortage item here. Prices are again sagging on short shoveling turnings. Alloys are stagnant and most other grades appear to be moving sluggishly. Most tonnage is going out of city.

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BOSTON—Most yards and brokers report no pep to business; the market a day to day proposition. A Providence yard says two-thirds of its business today is borings and turnings. That is not a general condition, 50 per cent being a fair average in many instances. Numerous yards have accumulated a stock of boilers and tanks, but do not have help to cut them up.

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BIRMINGHAM — The labor situation here is becoming increasingly serious insofar as scrap preparation is concerned. The draft has taken a number of key men from the yards and as a result dealers for the most part are taking only that material that is brought to the yards.

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BUFFALO — Further tightening of scrap is reported in this district. All mills remain in the market and one of the leading buyers is seeking more open hearth material to offset a loss of hot iron beginning April 15 when a blast furnace will be switched to merchant production. This buyer is receiving some scrap under allocation. No. 1 open hearth and cast scrap continues scarce.

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CINCINNATI—The market here tends firmer with virtually no bidding under the market except on alloys, which for the past several months have been almost a glut on the market. Open hearth material is particularly strong, although melters are not overly aggressive in taking material. Present attitude of consumers indicates that steel producers are in reasonably good position and are therefore not taking any more material than is necessary.

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NEW YORK—Scrap movement out of this area has dropped off, with very little buying activity discernible in alloy turnings and solids and low phos. However, while sales have dropped off, prices seem to be holding to the ceiling. Battlefield scrap has not come into this port in quantities expected. About 2500 tons have been offered during the past month, of which about 1000 tons were prepared material.

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PHILADELPHIA—All mills here are accepting carbon scrap shipments. The cast scrap situation remains unchanged with demand out-distancing current and future supply. Low phos sales are still slow with most of this grade being sold as No. 1.

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ST. LOUIS—Receipts of scrap in this area are only slightly below consumption, with good No. 2 melting steel lacking in sufficient quantity. Railroad material is beginning to move in better volume but most of this is allocated. Prices are firm, with borings and turnings the only grades showing any weakness.

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CHICAGO—New allocations have been made to district mills of West Coast shipyard scrap in quantities as yet undetermined but considerably smaller than a similar allocation some weeks ago. Shipment is on government bill of lading. Previously reported price weaknesses continue on blast furnace grades and machine shop turnings, with lack of mill interest the outstanding factor in both categories. Dealers are buying machine shop turnings for baling, however.

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DETROIT—Borings and machine shop turnings selling at 75c. per ton under ceiling. Low phos plate from dealers has been going at $1 per ton under ceiling. Supply of heavy scrap is off slightly, but sales continue at about unchanged levels.

IRON AND STEEL (OTHER THAN RAILROAD) SCRAP

(All Prices Are Per Gross Ton)

	BASIC OPEN HEARTH GRADES		BLAST FURNACE GRADES				ELECTRIC FURNACE, ACID OPEN HEARTH AND FOUNDRY GRADES										
							Low Phos.		Heavy Structural and Plate			Foundry Steel					
	No. 1 & 2 Hvy. Melt. No. 1 Cp. Blk. Shts. No. 1 & 2 Bundles No. 1 Busheling	Unbaled* Machine Shop Turnings	Mixed Borings and Turnings	Cast Iron Borings	Shovelling Turnings	No. 2 Busheling	Billet, Bloom, Forge Crops	Bar Crops, Punchings Plate Scrap and Cast Steel	3 ft. and Under	2 ft. and Under	1 ft. and Under	2 ft. and Under	1 ft. and Under	Auto. Springs, and Crankshafts	Alloy Free Low Phos. and Sulphur Turnings	Heavy Axle and Forge Turn. First Cut	Electric Furnace Bundles
Pittsburgh, Brackenridge, Butler, Monessen, Midland, Johnstown, Sharon, Canton, Steubenville, Warren, Youngstown, Weirton	$20.00	$15.00	$15.00	$16.00	$17.00	$17.50	$25.00	$22.50	$21.50	$22.00	$22.50	$21.50	$22.00	$21.00	$18.00	$19.50	$21.00
Cleveland, Middletown, Cincinnati, Portsmouth	19.50	14.50	14.50	15.50	16.50	17.00	24.50	22.00	21.00	21.50	22.00	21.00	21.50	20.50	17.50	19.00	20.50
Chicago, Claymont, Coatesville, Conshohocken, Harrisburg, Phoenixville, Sparrows Point	18.75	13.75	13.75	14.75	15.75	16.25	23.75	21.25	20.25	20.75	21.25	20.25	20.75	19.75	16.75	18.25	19.75
Ashland, Ky.	19.50	14.50	14.50	15.50	16.50	17.00	24.50	22.00	21.00	21.50	22.00	21.00	21.50	20.50	17.50	19.00	20.50
Buffalo, N. Y.	19.25	14.25	14.25	15.25	16.25	16.75	24.25	21.75	20.75	21.25	21.75	20.75	21.25	20.25	17.25	18.75	20.25
Bethlehem, Pa.; Kokomo, Ind.	18.25	13.25	13.25	14.25	15.25	15.75	23.25	20.75	19.75	20.25	20.75	19.75	20.25	19.25	16.25	17.75	19.25
Duluth, Minn.	18.00	13.00	13.00	14.00	15.00	15.50	23.00	20.50	19.50	20.00	20.50	19.50	20.00	19.00	16.00	17.50	19.00
Detroit, Mich.	17.85	12.85	12.85	13.85	14.85	15.35	22.85	20.35	19.35	19.85	20.35	19.35	19.85	18.85	15.85	17.35	18.85
Toledo, Ohio	.....	12.85	12.85	13.85	14.85	15.35	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
St. Louis, Mo.	17.50	12.50	12.50	13.50	14.50	15.00	22.50	20.00	19.00	19.50	20.00	19.00	19.50	18.50	15.50	17.00	18.50
Atlanta, Ga.; Alabama City, Ala.; Birmingham, Los Angeles, Pittsburg, Cal; San Francisco	17.00	12.00	12.00	13.00	14.00	14.50	22.00	19.50	18.50	19.00	19.50	18.50	19.00	18.00	15.00	16.50	18.00
Minnequa, Colo.	16.50	11.50	11.50	12.50	13.50	14.00	21.50	19.00	18.00	18.50	19.00	18.00	18.50	17.50	14.50	16.00	17.50
Seattle, Wash.	14.50	9.50	9.50	10.50	11.50	12.00	19.50	17.00	16.00	16.50	17.00	16.00	16.50	15.50	12.50	14.00	15.50

*Baled turnings are $5 per gross ton higher.

BUNDLES: Tin can bundles are $4 below dealers' No. 2 bundles; No. 3 bundles are $2 less than No. 1 heavy melting.

AT NEW YORK CITY or Brooklyn, the maximum shipping point price is $15.33 for No. 1 heavy melting, f.o.b. cars, f.a.s. vessel or loaded on trucks. Minimum set at $14 per gross ton at any shipping point in U. S. Other grades carry differentials similar to those in table. New Jersey prices must be computed on basis of all-rail. At Boston the maximum is $15.05 for No. 1 f.o.b. cars, f.a.s. vessel or loaded on trucks. Shipments from a New England shipping point to a consumer outside New England carry maximum transportation charge of $6.66 per ton.

SWITCHING CHARGES: Deductions for shipping points within basing point (cents per gross ton) are: Chicago, 84c.; Pittsburgh, Brackenridge, 55c.; Detroit, 53c.; Midland, Johnstown, Sharon, Youngstown, Warren, Weirton, Cleveland, Toledo, Los Angeles, San Francisco, Pittsburg, 42c.; Seattle, 38c.; Buffalo, Claymont, Harrisburg, 36c.; Atlanta, Birmingham, 32c.; Butler, Monessen, Canton, Steubenville, Cincinnati*, Portsmouth, Ashland, Coatesville, Phoenixville, Bethlehem, Kokomo, Duluth and St. Louis, 28c.; Alabama City, Ala., 26c.; Minnequa, Colo., 22c.; Middletown, 14c.; Conshohocken, Sparrows Point, 11c.

*Basic open hearth and foundry grades, and auto springs and crankshafts, deduct 80c. per ton.

BASING POINT includes switching districts of city named.

Basing point	Switching districts:
Pittsburgh	Bessemer, Homestead, Duquesne, Munhall, McKeesport
Cincinnati	Newport
St. Louis	Granite City, E. St. Louis, Madison, Ill.
Chicago	Gary
Claymont	Chester, Pa.
San Francisco	So. San Francisco, Niles, Oakland

MAXIMUM SHIPPING POINT PRICE: Where shipment is wholly or partially by rail or vessel, or combination of rail and vessel, the scrap is at shipping point when placed f.o.b. railroad or f.a.s. vessel. For motor vehicle shipments scrap is at shipping point when loaded. Then maximum shipping point price shall be: (a) For shipping point located within a basing point, prices shown in above table for scrap at basing point in which shipping point is located, minus applicable switching charge deduction shown in paragraph above labeled "Switching Charges." (b) For shipping points outside basing point, price listed in above table hereof for scrap at most favorable basing point, minus lowest charge for transportation from shipping point to such basing point by rail or water carrier or combination. Where vessel movement is involved, in lieu of established dock charge or any cost customarily incurred at the dock, 75c. per ton must be included as part of deduction in computing shipping point price; 50c. at Memphis; $1 at Great Lakes ports; and $1.25 at New England ports. If no established transportation rate exists for a portion of movement from shipping to basing point, actual charge or cost customarily incurred by shipper in such portion of movement shall be included as part of deduction in computing shipping point price. For exceptions see official order.

UNPREPARED SCRAP: For unprepared scrap, maximum prices shall be $3.50 (and in the case of the material from which No. 1, No. 2, and No. 3 bundles are made $4) less than maximum prices for the corresponding prepared scrap. In no case, however, shall electric furnace, acid open hearth and foundry grades be used as the corresponding prepared scrap. A preparation-in-transit charge for unprepared scrap is provided.

NEW LISTED GRADES: Priced in dollars per gross ton less than No. 1 heavy melting steel. Pit scrap, ladle skulls, slag reclaim, etc., of 85% or more Fe priced less $2; 75 to 85% Fe less $4; under 75% Fe less $8 per ton. Mill scale less $8 per ton. Mill cinder and grindings, shipping point maximum price of $4 per gross ton at all U. S. shipping points.

CHEMICAL BORINGS: No. 1 (new, clean, containing not more than 1% oil), $1 less than No. 1 heavy melting; No. 2 (new, clean, containing not more than 1.5% oil), $2 less than No. 1 heavy melting. If loaded in box cars add 75c. mill scale, $8 less than No. 1 heavy melting.

Tool Steel Scrap Prices (MPR 379)

	SEGREGATED		UNSEGREGATED SOLIDS	UNSEGREGATED TURNINGS
	Solids Per Lb. Cont. W	Turnings Per Lb. Cont. W		
Type 1. 12% min. W, 1% max. Mo	$1.80	$1.60	$1.50 per lb. contained W if 5% or more.	$1.30 per lb. contained W if 5% or more.
Type 2. 5 to 12% W, 1% max. Mo	1.60	1.40	$1.15 per lb. contained W if 1 to 5%.	$1.00 per lb. contained W if 1 to 5%.
Type 3. 1 to 5% W, 1.5% max. Mo	1.25	1.25	$0.80 per lb. contained Mo if 1.5% or more.	$0.70 per lb. contained Mo if 1.5% or more.
*Type 4. 7% min. Mo, 2% max. W	0.125	0.105	If both W and Mo are within ranges, payment may be for both W and Mo content.	
*Type 5. 3.5 to 6% Mo, 4.5 to 6% W	0.135	0.115		

*Per lb. of scrap material.
If segregated, a premium of $1.50 per lb. of contained Co allowed if Co content is 3% or over. No scrap considered segregated if Co content ranges between 0.5 and 3%.
If Cu or Ni content over 0.25%, price shall be reduced by 50%.
If 500 lb. or less is sold, either segregated or unsegregated, price shall be reduced 2c. per lb. of scrap material.

Cast Iron Scrap

Maximum on-line price, per gross ton, for any of the following cast grades will be the price shown at the highest priced zone in which the railroad operates or is located.

	Per Gross Ton		
	Zone A	Zone B	Zone C
Cast Iron, No. 1	$18.00	$19.00	$20.00
Cast Iron, No. 2	17.00	18.00	19.00
Cast Iron, No. 3	14.50	15.50	16.50
Cast Iron, No. 4	13.25	14.25	15.25
Cast Iron Brake Shoes	13.25	14.25	15.25
Malleable	20.00	21.00	22.00
Wheels, No. 1	18.00	19.00	20.00

Zone A includes Mont., Idaho, Wyo., Nev., Utah, Ariz., and N. M. Zone B includes N. D., S. D., Neb., Colo., Kan., Okla., Texas, and Fla. Zone C includes all states not named in zones A and B, and includes switching district of Kansas City, Kansas-Missouri.

For cast, an in-transit preparation fee will be applicable only for preparing Cast Iron No. 3 into Cast Iron No. 1, for which the maximum preparation fee shall be $3.50 per gross ton. (Previous dealer fee was $2.50.)

CAST IRON GRADE DEFINITIONS: Cast Iron, No. 1—Cast iron scrap such as columns, pipe, plates and/or castings of miscellaneous nature, but free from stove plate, brake shoes, and/or burnt scrap. Must be cupola size not over 24 x 30 in. and no pieces to weigh more than 150 lb. Free of foreign material. No. 2—Cast iron scrap in pieces weighing over 150 lb. not more than 500 lb. and free from burnt cast. No. 3—Cast iron scrap in pieces over 500 lb., includes cylinders, driving wheel centers, and/or all other castings. Free from hammer blocks or bases. No. 4—Burnt cast iron scrap such as grate bars, stove parts, and/or miscellaneous burnt scrap. No. 5—Driving and/or car brake shoes of all types except composition filled. Malleable—Malleable parts of automobiles, railroad cars, and locomotives. No. 7—Wheels, No. 1, includes cast iron car and/or locomotive wheels.

Comparison of Prices . . .

Advance Over Past Week in **Heavy Type**; Declines in *Italics*.

[Prices Are F.O.B. Major Basing Points]

(Cents Per Lb.)	April 11, 1944	April 4, 1944	Mar. 7, 1944	April 13, 1943
Hot rolled sheets	2.10	2.10	2.10	2.10
Cold rolled sheets	3.05	3.05	3.05	3.05
Galvanized sheets (24 ga.)	3.50	3.50	3.50	3.50
Hot rolled strip	2.10	2.10	2.10	2.10
Cold rolled strip	2.80	2.80	2.80	2.80
Plates	2.10	2.10	2.10	2.10
Plates, wrought iron	3.80	3.80	3.80	3.80
Stain's c.r. strip (No. 302)	28.00	28.00	28.00	28.00
Tin and Terne Plate: (Dollars Per Base Box)				
Tin plate, standard cokes	$5.00	$5.00	$5.00	$5.00
Tin plate, electrolytic	4.50	4.50	4.50	4.50
Special coated mfg. ternes	4.30	4.30	4.30	4.30
Bars and Shapes: (Cents Per Lb.)				
Merchant bars	2.15	2.15	2.15	2.15
Cold finished bars	2.65	2.65	2.65	2.65
Alloy bars	2.70	2.70	2.70	2.70
Structural shapes	2.10	2.10	2.10	2.10
Stainless bars (No. 302)	24.00	24.00	24.00	24.00
Wrought iron bars	4.40	4.40	4.40	4.40
Wire and Wire Products: (Cents Per Lb.)				
Plain wire	2.60	2.60	2.60	2.60
Wire nails	2.55	2.55	2.55	2.55
Rails: (Dollars Per Gross Ton)				
Heavy rails	$40.00	$40.00	$40.00	$40.00
Light rails	40.00	40.00	40.00	40.00
Semi-Finished Steel: (Dollars Per Gross Ton)				
Rerolling billets	$34.00	$34.00	$34.00	$34.00
Sheet bars	34.00	34.00	34.00	34.00
Slabs, rerolling	34.00	34.00	34.00	34.00
Forging billets	40.00	40.00	40.00	40.00
Alloy blooms, billets, slabs	54.00	54.00	54.00	54.00
Wire Rods and Skelp: (Cents Per Lb.)				
Wire rods	2.00	2.00	2.00	2.00
Skelp	1.90	1.90	1.90	1.90

(Per Gross Ton)	April 11, 1944	April 4, 1944	Mar. 7, 1944	April 13, 1943
No. 2 fdy., Philadelphia	$25.84	$25.84	$25.84	$25.89
No. 2, Valley furnace	24.00	24.00	24.00	24.00
No. 2, Cincinnati	25.11	25.11	25.11	24.68
No. 2, Birmingham	20.38	20.38	20.38	20.38
No. 2, foundry, Chicago†	24.00	24.00	24.00	24.00
Basic, del'd eastern Pa.	25.34	25.34	25.34	25.39
Basic, Valley furnace	23.50	23.50	23.50	23.50
Malleable, Chicago†	24.00	24.00	24.00	24.00
Malleable, Valley	24.00	24.00	24.00	24.00
L. S. charcoal, Chicago	37.34	37.34	37.34	37.34
Ferromanganese‡	135.00	135.00	135.00	135.00

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton.
‡For carlots at seaboard.

Scrap: (Per Gross Ton)				
Heavy melt'g steel, P'gh.	$20.00	$20.00	$20.00	$20.00
Heavy melt'g steel, Phila.	18.75	18.75	18.75	18.75
Heavy melt'g steel, Ch'go	18.75	18.75	18.75	18.75
No. 1 hy. comp. sheet, Det.	17.85	17.85	17.85	17.85
Low phos. plate, Youngs'n	22.50	22.50	22.50	22.50
No. 1 cast, Pittsburgh	20.00	20.00	20.00	20.00
No. 1 cast, Philadelphia	20.00	20.00	20.00	20.00
No. 1 cast, Ch'go	20.00	20.00	20.00	20.00
Coke, Connellsville: (Per Net Ton at Oven)				
Furnace coke, prompt	$7.00	$7.00	$7.00	$6.50
Foundry coke, prompt	8.25	8.25	8.25	7.375
Non-Ferrous Metals: (Cents per Lb. to Large Buyers)				
Copper, electro., Conn.	12.00	12.00	12.00	12.00
Copper, Lake	12.00	12.00	12.00	12.00
Tin (Straits), New York	52.00	52.00	52.00	52.00
Zinc, East St. Louis	8.25	8.25	8.25	8.25
Lead, St. Louis	6.35	6.35	6.35	6.35
Aluminum, Virgin, del'd.	15.00	15.00	15.00	15.00
Nickel, electrolytic	35.00	35.00	35.00	35.00
Magnesium, ingot	20.50	20.50	20.50	20.50
Antimony (Asiatic), N. Y.	16.50	16.50	16.50	16.50

The various basing points for finished and semi-finished steel are listed in the detailed price tables, pages 151-159.

Composite Prices . . .

Starting with the issue of April 22, 1943, the weighted finished steel price index was revised for the years 1941, 1942 and 1943. See explanation of the change on page 90 of the April 22, 1943, issue.

	FINISHED STEEL	PIG IRON	SCRAP STEEL
April 11, 1944	2.25513c. a Lb.	23.61 a Gross Ton	$19.17 a Gross Ton
One week ago	2.25513c. a Lb.	23.61 a Gross Ton	$19.17 a Gross Ton
One month ago	2.25513c. a Lb.	23.61 a Gross Ton	$19.17 a Gross Ton
One year ago	2.26190c. a Lb.	23.61 a Gross Ton	$19.17 a Gross Ton

	FINISHED STEEL HIGH	FINISHED STEEL LOW	PIG IRON HIGH	PIG IRON LOW	SCRAP STEEL HIGH	SCRAP STEEL LOW
1943	2.25513c.,	2.25513c.,	$23.61	$23.61	$19.17	$19.17
1942	2.26190c.,	2.26190c.,	23.61	23.61	19.17	19.17
1941	2.43078c.,	2.43078c.,	$23.61, Mar. 20	$23.45, Jan. 2	$22.00, Jan. 7	$19.17, Apr. 10
1940	2.30467c., Jan. 2	2.24107c., Apr. 16	23.45, Dec. 23	22.61, Jan. 2	21.83, Dec. 30	16.04, Apr. 9
1939	2.35367c., Jan. 3	2.26689c., May 16	22.61, Sept. 19	20.61, Sept. 12	22.50, Oct. 3	14.08, May 16
1938	2.58414c., Jan. 4	2.27207c., Oct. 18	23.25, June 21	19.61, July 6	15.00, Nov. 22	11.00, June 7
1937	2.58414c., Mar. 9	2.32263c., Jan. 4	23.25, Mar. 9	20.25, Feb. 16	21.92, Mar. 30	12.67, June 8
1936	2.32263c., Dec. 28	2.05200c., Mar. 10	19.74, Nov. 24	18.73, Aug. 11	17.75, Dec. 21	12.67, June 9
1935	2.07642c., Oct. 1	2.06492c., Jan. 8	18.84, Nov. 5	17.83, May 14	13.42, Dec. 10	10.33, Apr. 29
1934	2.15367c., Apr. 24	1.95757c., Jan. 2	17.90, May 1	16.90, Jan. 27	13.00, Mar. 13	9.50, Sept. 25
1933	1.95578c., Oct. 3	1.75836c., May 2	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	1.89196c., July 5	1.83901c., Mar. 1	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.43, July 5
1931	1.99626c., Jan. 13	1.86586c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.25488c., Jan. 7	1.97319c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.31773c., May 28	2.26498c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3

Weighted index based on steel bars, beams, tank plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing 78 per cent of the United States output. Index recapitulated in Aug. 28, 1941, issue.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

. . . Prices of Finished Iron and Steel

Steel prices shown here are f.o.b. basing points, in cents per lb., unless otherwise indicated. Extras apply. Delivered prices do not reflect 3% tax on freight. (1) Mill run sheet, 10c. per 100 lb. under base; primes 25c. above base. (2) Unassorted 8-lb. coating. (3) Widths up to 12-in. (4) 0.25 carbon and less. (5) Applies to certain width and length limitations. (6) For merchant trade. (7) For straight length material only from producer to consumer. Discount of 25c. per 100 lb. to fabricators. (8) Also shafting. For quantities of 20,000 to 29,999 lb. (9) Carload lot in manufacturing trade. (10) Prices do not apply if rail and water is used. (12) Boxed. (13) Portland and Seattle price, San Francisco 2.50c. (14) This base price to be used in figuring annealed, bright finish wires, commercial spring wire.

Basing Point → / Product ↓	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio	Gulf Ports, Cars	Pacific Ports, Cars [10]	DELIVERED TO Detroit	New York	Philadelphia
Hot Rolled Sheets	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.20¢	2.10¢		2.65¢	2.20¢	2.34¢	2.27¢
Cold Rolled Sheets[1]	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3.05¢		3.70¢	3.15¢	3.39¢	3.37¢
Galvanized Sheets (24 gage)	3.50¢	3.50¢	3.50¢		3.50¢	3.50¢	3.50¢	3.50¢	3.60¢	3.50¢		4.05¢		3.74¢	3.67¢
Enameling Sheets (20 gage)	3.35¢	3.35¢	3.35¢	3.35¢			3.35¢		3.45¢	3.35¢		4.00¢	3.45¢	3.71¢	3.67¢
Long Ternes[2]	3.80¢	3.80¢	3.80¢									4.55¢		4.16¢	4.12¢
Hot Rolled Strip[3]	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢		2.75¢	2.20¢	2.46¢	
Cold Rolled Strip[4]	2.80¢	2.90¢		2.80¢			2.80¢	(Worcester = 3.00¢)					2.90¢	3.16¢	
Cooperage Stock Strip	2.20¢	2.30¢			2.20¢		2.20¢							2.56¢	
Commodity C-R Strip	2.95¢	3.05¢		2.95¢			2.95¢	(Worcester = 3.35¢)					3.05¢	3.31¢	
Coke Tin Plate, Base Box	$5.00	$5.00	$5.00						$5.10					5.36¢	5.32¢
.50 Electro Tin Plate, Box	$4.50	$4.50	$4.50						$4.60						
.75 Electro Tin Plate, Box	$4.65		$4.65						$4.75						
Black Plate (29 gage)[5]	3.05¢	3.05¢	3.05¢						3.15¢			4.05¢[13]			3.37¢
Mfg. Ternes, Special Box	$4.30	$4.30	$4.30						$4.40						
Carbon Steel Bars	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢		(Duluth = 2.25¢)			2.50¢	2.80¢	2.25¢	2.49¢	2.47¢
Rail Steel Bars[6]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢					2.50¢	2.80¢			
Reinforcing (Billet) Bars[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			2.50¢	2.55¢[13]	2.25¢	2.39¢	
Reinforcing (Rail) Bars[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢				2.50¢	c2.55¢[13]	2.25¢		2.47¢
Cold Finished Bars[8]	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢		(Detroit = 2.70¢)			(Toledo = 2.80¢)			2.99¢	2.97¢
Alloy Bars, Hot Rolled	2.70¢	2.70¢				2.70¢	(Bethlehem, Massillon, Canton = 2.70¢)						2.80¢		
Alloy Bars, Cold Drawn	3.35¢	3.35¢	3.35¢	3.35¢		3.35¢							3.45¢		
Carbon Steel Plates	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢	(Coatesville and Claymont = 2.10¢) 2.10¢	2.35¢		2.45¢	2.65¢	2.32¢	2.29¢	2.15¢
Floor Plates	3.35¢	3.35¢									3.70¢	4.00¢		3.71¢	3.67¢
Alloy Plates	3.50¢	3.50¢			(Coatesville = 3.50¢)						3.95	4.15¢		3.70¢	3.59¢
Structural Shapes	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢	(Bethlehem = 2.10¢)				2.45¢	2.75¢		2.27¢	2.215¢
SPRING STEEL, C-R 0.26 to 0.50 Carbon	2.80¢			2.80¢			(Worcester = 3.00¢)								
0.51 to 0.75 Carbon	4.30¢			4.30¢			(Worcester = 4.50¢)								
0.76 to 1.00 Carbon	6.15¢			6.15¢			(Worcester = 6.35¢)								
1.01 to 1.25 Carbon	8.35¢			8.35¢			(Worcester = 8.55¢)								
Bright Wire[14]	2.60¢	2.60¢		2.60¢	2.60¢		(Worcester = 2.70¢)			(Duluth = 2.65¢)		3.10¢			2.92¢
Galvanized Wire	Add proper size extra and galvanizing extra to Bright Wire base.														
Spring (High Carbon)	3.20¢	3.20¢		3.20¢			(Worcester = 3.30¢)					3.70¢			3.53¢
Steel Sheet Piling	2.40¢	2.40¢				2.40¢						2.95¢			3.72¢

EXCEPTIONS TO PRICE SCHED. NO. 6

Slabs—Andrews Steel Co. $41 basing pts.; Wheeling Steel Corp. $34 Portsmouth, Ohio; Empire Sheet & Tin Plate Corp. $41; Phoenix Iron Co. (rerolling) $41, (forging) $47; Granite City Steel Co. $47.50.

Blooms—Phoenix Iron Co. (rerolling) $41, (forging) $47.

Sheet Bar—Empire Sheet & Tin Plate Co. $39 mill; Wheeling Steel Corp. $38 Portsmouth, Ohio.

Billets, Forging—Andrews Steel Co. $50 basing pts.; Follansbee Steel Corp. $49.50 Toronto; Phoenix Iron Co. $47.00 mill.

Billets, Rerolling—Continental Steel Corp. may charge Acme Steel in Chicago switching area $34 plus freight from Kokomo, Ind.; Northwestern Steel & Wire Co. (Lend-Lease) $41 mill; Wheeling Steel Corp. (small) $36 Portsmouth, Ohio; (blooming mill sizes) applicable base, f.o.b. Portsmouth, Ohio; Stanley Works may sell Washburn Wire Co. under allocation at $39 Bridgeport, Conn.; Keystone Steel & Wire Co. may sell Acme Steel Co. at Chicago base, f.o.b. Peoria; Phoenix Iron Co. $41 mill; Continental Steel Corp. (1¾ x 1¾) $39.50, (2 x 2) $40.60 Kokomo, Ind. (these prices include $1 size extra); Keystone Steel & Wire Co. $36.40 Peoria; Connors Steel Co. $50.69 Birmingham; Ford Motor Co. $34 Dearborn, Mich.

Structural Shapes—Phoenix Iron Co. $2.35 basing pts., (export) $2.50 Phoenixville; Knoxville Iron Co. $2.30 basing pts.

Bar Size Shapes—(Angles) W. Ames & Co., 10 tons or over, $3.10 mill.

Rails—Sweet Steel Co. (rail steel) $50 mill; West Virginia Rail Co. (lightweight) on allocation based Huntington, W. Va.; Colorado Fuel & Iron Corp. $45 Pueblo.

Hot Rolled Plate—Granite City Steel Co. $2.65 mill; Knoxville Iron Co. $2.25 basing pts.; Kaiser Co. $3.20 Pacific Ports.

Merchant Bars—W. Ames & Co., 10 tons and over, $2.85 mill; Eckels-Nye Steel Corp., $2.50 basing pts. (rail steel) $2.40; Phoenix Iron Co. $2.40 basing pts.; Sweet Steel Co. (rail steel) $2.35 mill; Joslyn Mfg. & Supply Co. $2.35 Chicago; Central Iron & Steel Co. $2.20 basing pts.; Granite City Steel Co. $2.35 Granite City; Calumet Steel Div., Borg Warner Corp. (8 in. mill bars) $2.35 Chicago; Knoxville Iron Co. $2.30 basing pts. Laclede Steel Co., sales to LaSalle Steel granted Chicago base, f.o.b. Madison, Ill.

Reinforcing Bars—W. Ames & Co., 10 tons and over, $2.85 mill; Sweet Steel Co. (rail steel) $2.35 mill; Columbia Steel Co. $2.50 Pacific Ports.

Cold Finished Bars—Keystone Drawn Steel Co. on allocation, Pittsburgh c.f. base plus c/l freight on hot rolled bars Pittsburgh to Spring City, Pa.; New England Drawn Steel Co. on allocation outside New England, Buffalo c.f. base plus c/l freight Buffalo to Massfield, Mass., f.o.b. Massfield.; Empire Finished Steel Corp. on allocation outside New England, Buffalo c.f. base plus c/l freight Buffalo to plants f.o.b. plant; Compressed Steel Shafting Co. on allocation outside New England, Buffalo base plus c/l freight Buffalo to Readville, Mass. f.o.b. Readville; Medart Co. in certain areas, Chicago c.f. base plus c/l freight Chicago to St. Louis, f.o.b. St. Louis.

Alloy Bars—Texas Steel Co. for delivery except Texas and Okla. Chicago base, f.o.b. Fort Worth, Tex.; Connors Steel Co. shipped outside Ala., Mississippi, Louisiana, Georgia, Florida, Tenn., Pittsburgh base, f.o.b. Birmingham.

Hot Rolled Strip—Joslyn Mfg. & Supply Co. $2.30 Chicago; Knoxville Iron Co. $2.25 basing pts.

Hot Rolled Sheets—Andrews Steel Co., Middletown base on shipments to Detroit or area; Parkersburg Iron & Steel Co., $2.25 Parkersburg.

Galvanized Sheets—Andrews Steel Co., $3.75 basing pts.; Parkersburg Iron & Steel Co. $3.85 Parkersburg; Apollo Steel Co. $3.75 basing pts.; Continental Steel Co., Middletown base on Kokomo, Ind., product; Superior Sheet Steel Co., Pittsburgh base except for Lend-Lease.

Pipe and Tubing—South Chester Tube Co. when priced at Pittsburgh, freight to Gulf Coast and Pacific Ports may be charged from Chester, Pa., also to points lying west of Harrisburg, Pa.

Black Sheets—Empire Sheet and Tinplate Co., maximum base price mill is $2.45 per 100 lb., with differentials, transportation charges, etc., provided in RPS. No. 6.

WAREHOUSE PRICES

Delivered metropolitan areas per 100 lb. These are zoned warehouse prices in conformance with latest zoning amendments to OPA Price Schedule 49.

Cities	SHEETS			STRIP		Plates ¼ in. and heavier	Structural Shapes	BARS		ALLOY BARS			
	Hot Rolled (10 gage)	Cold Rolled	Galvanized (24 gage)	Hot Rolled	Cold Rolled			Hot Rolled	Cold Finished	Hot Rolled, NE 8617-20	Hot Rolled, NE 9442-45 Ann.	Cold Drawn, NE 8617-20	Cold Drawn, NE 9442-45 Ann.
**Philadelphia	3.518	4.872[5]	5.018a	3.922	4.772	3.605	3.666	3.822	4.072	5.966	7.066	7.272	8.322
New York	3.590	4.613[3]	5.010	3.974[6]	4.772	3.768	3.758	3.753	4.103	6.008	7.108	7.303	8.353
Boston	3.744	4.744[9]	5.224[9]	4.106	4.715	3.912	3.912	4.044	4.144	6.162	7.262	7.344	8.394
Baltimore	3.394	4.852	4.894	3.902	4.752	3.594	3.759	3.802	4.052	....	....	....	....
Norfolk	3.771	4.965	5.371	4.165	4.865	3.971	4.002	4.065	4.165	....	....	....	....
Chicago	3.25	4.20	5.231	3.60	4.65[17]	3.55	3.55	3.50	3.75	5.75	6.85	6.85	7.90
Milwaukee	3.387	4.337[3]	5.272[4]	3.737	4.787[17]	3.687	3.687	3.637	3.887	5.987	7.087	7.087	8.137
Cleveland	3.35	4.40	4.877[4]	3.60	4.45	3.40	3.588	3.35	3.75	5.956	7.056	6.85	7.90
Buffalo	3.35	4.40	4.75[4]	3.819	4.669	3.63	3.40	3.35	3.75	5.75	6.85	6.85	7.90
Detroit	3.45	4.50	5.00[4]	3.70	4.659[17]	3.609	3.661	3.45	3.80	6.08	7.18	7.159	8.209
Cincinnati	3.425	4.475[3]	4.825[5]	3.675	4.711	3.611	3.691	3.611	4.011	....	....	....	....
St. Louis	3.397	4.347[3]	5.172[4]	3.747	4.931[17]	3.697	3.697	3.647	4.031	6.131	7.231	7.231	8.281
Pittsburgh	3.35	4.40	4.75	3.60	4.45	3.40	3.40	3.35	3.75	5.75	6.85	6.85	7.90
St. Paul	3.51	4.46	5.257[4]	3.86	4.35[17]	3.81[13]	3.81[13]	3.76[13]	4.361	6.09	7.19	7.561	8.711
Omaha	3.865	5.443	5.608[4]	4.215	....	4.165	4.165	4.115	4.43	....	....	....	....
Indianapolis	3.58	3.58	4.568	4.918	3.768	4.78	3.63	3.58	3.98	6.08	7.18	7.18	8.23
Birmingham	3.45	....	4.75	3.70	....	3.55	3.55	3.50	4.43	....	....	....	....
Memphis	3.965[7]	4.66	3.265	4.215	....	4.065	4.065	4.015	4.33	....	....	....	....
New Orleans	4.058*	4.95	5.358	4.308	....	4.158	4.158*	4.108*	4.629	....	....	....	....
Houston	3.763	5.573	6.313[1]	4.313	....	4.25	4.25	3.75	6.373[3]	7.223	8.323	8.323	9.373
Los Angeles	5.00	7.203	6.104	4.95	5.613[15]	4.95	4.65	4.40	5.583	8.304	9.404	9.404	10.454
San Francisco	4.55[14]	7.304	6.354	4.50[14]	7.333[17]	4.65[14]	4.35[14]	4.15[14]	5.333	8.304	9.404	9.404	10.454
Seattle	4.65[12]	7.054	5.954	4.25[12]	....	4.75[12]	4.45[12]	4.35[12]	5.783	....	9.404	....	....
Portland	4.65[11]	6.604	5.754	4.75[11]	....	4.75[11]	4.45[11]	4.45[11]	5.533	8.304	9.404	8.304	9.404
Salt Lake City	4.53[17]	....	6.171[8]	5.53[17]	....	4.98[17]	4.98[17]	4.88[17]	5.90	....	....	....	....

NATIONAL EMERGENCY (N. E.) STEELS
(Hot Rolled Mill Extras for Alloy Content)

Designation	CHEMICAL COMPOSITION LIMITS, PER CENT								Basic Open-Hearth		Electric Furnace	
	Carbon	Manganese	Phosphorus Max.	Sulphur Max.	Silicon	Chromium	Nickel	Molybdenum	Bars and Bar-Strip	Billets, Blooms and Slabs	Bars and Bar-Strip	Billets, Blooms and Slabs
NE 1330	.28/ .33	1.60/1.90	.040	.040	.20/ .35	.....	.....	.....	.10c	$2.00	.....	.....
NE 1335	.33/ .38	1.60/1.90	.040	.040	.20/ .35	.....	.....	.....	.10	2.00	.....	.....
NE 1340	.38/ .43	1.60/1.90	.040	.040	.20/ .35	.....	.....	.....	.10	2.00	.....	.....
NE 1345	.43/ .48	1.60/1.90	.040	.040	.20/ .35	.....	.....	.....	.10	2.00	.....	.....
NE 1360	.48/ .53	1.60/1.90	.040	.040	.20/ .35	.....	.....	.....	.10	2.00	.....	.....
NE 8613	.12/ .17	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25¢	$25.00
NE 8615	.13/ .18	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8617	.15/ .20	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8620	.18/ .23	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8630	.28/ .33	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8635	.33/ .38	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8637	.35/ .40	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8640	.38/ .43	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8642	.40/ .45	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8645	.43/ .48	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8650	.48/ .53	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8720	.18/ .23	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40 .70	.20/ .30	.80	16.00	1.30	26.00
NE 9255	.50/ .60	.70/ .95	.040	.040	1.80/2.20	.....	.....	.....	.40	8.00	.....	.....
NE 9260	.55/ .65	.70/1.00	.040	.040	1.80/2.20	.....	.....	.....	.40	8.00	.....	.....
NE 9261	.55/ .65	.70/1.00	.040	.040	1.80/2.20	.10/ .25	.....	.....	.65	13.00	.....	.....
NE 9262	.55/ .65	.70/1.00	.040	.040	1.80/2.20	.25/ .40	.....	.....	.65	13.00	.....	.....
NE 9415	.13/ .18	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9420	.18/ .23	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9422	.20/ .25	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9425	.23/ .28	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9430	.28/ .33	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9435	.33/ .38	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9437	.35/ .40	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9440	.38/ .43	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9442	.40/ .45	1.00/1.30	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.80	16.00	1.30	26.00
NE 9445	.43/ .48	1.00/1.30	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.80	16.00	1.30	26.00
NE 9450	.48/ .53	1.20/1.50	.040	.040	.20/ .35	.30/ 50	.30/ .60	.08/ .15	.80	16.00	1.30	26.00
NE 9537*	.35/ .40	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9540*	.38/ .43	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9542*	.40/ .45	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9545*	.43/ .48	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9550*	.48/ .53	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00

*Recommended for large sections only. Note: The extras shown are in addition to a base price of 2.70c. per 100 lb., on finished products and $54 per gross ton on semi-finished steel major basing points and are in cents per 100 lb. and dollars per gross ton in semi-finished. When acid open-hearth is specified and acceptable add to basic open hearth alloy differential 0.25c. per lb. for bars and bar strip, $5.00 per gross ton for billets, blooms and slabs. The ranges shown above are restricted to sizes 100 sq. in. or less or equivalent cross sectional area 18 in. wide or under with a max. individual piece weight of 7000 lb.

Base Quantities

Standard unless otherwise keyed on prices.

HOT ROLLED: Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

COLD ROLLED: Sheets, 400 to 1499 lb.; strip, extras on all quantities; bars, 1500 lb. base; NE alloy bars, 1000 to 39,999 lb.

EXCEPTIONS: (1) 150 to 499 lb. (2) 150 to 1499 lb. (3) 400 to 1499 lb. (4) 450 to 1499 lb. (5) 500 to 1499 lb. (6) 0 to 1999 lb. (7) 400 to 1999 lb. (8) 1000 to 1999 lb. (9) 450 to 3749 lb. (10) 400 to 3999 lb. (11) 300 to 4999 lb. (12) 300 to 10,000 lb. (13) 400 to 14,999 lb. (14) 400 lb. and over. (15) 1000 lb. and over. (16) 1500 lb. and over. (17) 2000 lb. and over. (18) 3500 lb. and over.

(*) Philadelphia: Galvanized sheets, 25 or more bundles.

Extra for size, quality, etc., apply on above quotations.

*Add 0.271c. for sizes not rolled in Birmingham.

**City of Philadelphia only. Applicable freight rates must be added to basing point prices to obtain delivered price to other localities in metropolitan area.

LAKE SUPERIOR ORES

(51.50% *Fe, Natural Content, Delivered Lower Lake Ports)**

	Per Gross Ton
Old range, bessemer, 51.50	$4.75
Old range, non-bessemer, 51.50	4.60
Mesaba, bessemer, 51.50	4.60
Mesaba, non-bessemer, 51.50	4.45
High phosphorus, 51.50	4.35

*Adjustments are made to indicate prices based on variance of Fe content of ores as analyzed on a dry basis by independent laboratories.

FLUORSPAR

Maximum price f.o.b. consumer's plant, $30 per short ton plus either (1) rail freight from producer to consumer, or (2) rail freight from Rosiclare, Ill., to consumer, whichever is lower.

Exception

When the WPB Steel Division certifies in writing the consumer's need for one of the higher grades of metallurgical fluorspar specified in the table below the price shall be taken from the table plus items (1 and 2) from paragraph above.

Effective CaF_2 Content:	*Base price per short ton*
70% or more	$33.00
65% but less than 70%	32.00
60% but less than 65%	31.00
Less than 60%	30.00

PRICES

SEMI-FINISHED STEEL

Ingots, Carbon, Rerolling

Base per gross ton, f.o.b. mill.... $31.00
Exceptions: Phoenix Iron Co. may charge $38.75; Kaiser Co., $43.00 f.o.b. Pacific Coast Ports; Empire Sheet & Tinplate Co., $34.25.

Ingots, Carbon, Forging

Base per gross ton, f.o.b. Birmingham, Buffalo, Chicago, Cleveland, Gary, Pittsburgh, Youngstown $36.00
Exceptions: Phoenix Iron Co. may charge $43.00; Empire Sheet & Tinplate Co., $39.25, f.o.b. Mansfield, Ohio; West Coast producers, $48.00, f.o.b. Pacific Coast Ports.

Ingots, Alloy

Base per gross ton, f.o.b. Bethlehem, Buffalo, Canton, Coatesville, Chicago, Massillon, Pittsburgh $45.00
Exceptions: C/L delivered Detroit add $2.00; delivered East Michigan add $3.00. Connors Steel Co. may charge $45.00 f.o.b. Birmingham.

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (rerolling only). Prices delivered Detroit are $2.00 higher; delivered E. Michigan, $3 higher; f.o.b. Duluth, billets only, $2.00 higher; billets f.o.b. Pacific ports are $12 higher. Delivered prices do not reflect three per cent tax on freight rates.

	Per Gross Ton
Rerolling	$34.00
Forging quality	40.00

For exceptions on semi-finished steel see the footnote on the page of finished steel prices.

Alloy Billets, Blooms, Slabs

Pittsburgh, Chicago, Canton, Massillon, Buffalo, or Bethlehem, per gross ton 54.00
Price delivered Detroit $2.00 higher; E. Michigan $3.00 higher.

Shell Steel

	Per Gross Ton
3 in. to 12 in.	$52.00
12 in. to 18 in.	54.00
18 in. and over	56.00

Basic open hearth shell steel, f.o.b. Pittsburgh, Chicago, Buffalo, Gary, Cleveland, Youngstown and Birmingham.
Prices delivered Detroit are $2.00 higher; E. Michigan, $3 higher.
Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting, or quantity.

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point.

	Per Gross Ton
Open hearth or bessemer	$34.00

Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved, universal and sheared	1.90c.

Wire Rods

(*No. 5 to 9/32 in.*)

	Per Lb.
Pittsburgh, Chicago, Cleveland	2.00c.
Worcester, Mass.	2.10c.
Birmingham	2.00c.
San Francisco	2.50c.
Galveston	2.25c.

9/32 in. to 47/64 in., 0.15c. a lb. higher. Quantity extras apply.

TOOL STEEL

(*F.o.b. Pittsburgh, Bethlehem, Syracuse*)

	Base per lb.
High speed	67c.
Straight molybdenum	54c.
Tungsten-molybdenum	57½c.
High-carbon-chromium	43c.
Oil hardening	24c.
Special carbon	22c.
Extra carbon	18c.
Regular carbon	14c.

Warehouse prices east of Mississippi are 2c. a lb. higher; west of Mississippi 1c. higher.

CLARKTOR-6
INDUSTRIAL TRACTOR
Moves Material Faster TO POINT OF USE

An all-purpose tractor for inside and outside heavy duty work

Write for New Vest Pocket Catalog

CLARK TRUCTRACTOR
DIVISION OF CLARK EQUIPMENT COMPANY
BATTLE CREEK, MICHIGAN, U.S.A.

JOHNSON Wire

High Carbon

Round — Half Round — Oval — Square — Flat — Triangular and Special Shapes.

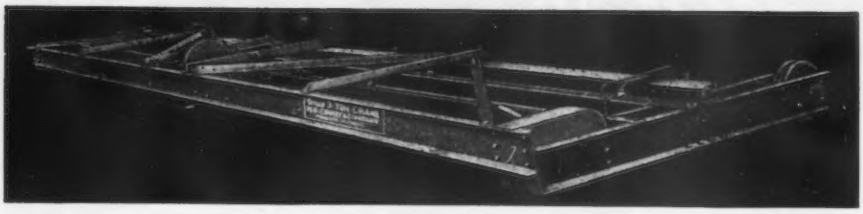
Bright—Coppered—Liquor Finish—Bronze Plated—Tinned—Cadmium—Bright Galvanized—Oil Tempered Round—Flat and Shaped Wires.

AIRCRAFT CABLE WIRE (XLO Brand) extra high fatigue wire drawn under constant laboratory control.

MUSIC WIRE (XLO Brand) wire of a thousand uses. (WD-1085 — WD-1095). Wire sizes .003" to .200" dia.

JOHNSON STEEL & WIRE CO., INC.
WORCESTER 1, MASSACHUSETTS
NEW YORK ATLANTA AKRON CHICAGO LOS ANGELES

CONCO 3-Motor Single Girder CAB OR FLOOR OPERATED ELECTRIC CRANE . . .



● Available in capacities of one through five tons for floor or cab operation. Simply, ruggedly designed for low first cost and maintenance. Used with Low Headroom Type Hoist, provides for maximum space coverage horizontally and vertically. Effective in even a minimum space. Write for Bulletin 2000.

Write for Bulletin 26000 describing the Torpedo Hoist shown. Three capacities 250 lb. — $139.50, 500 lb. — $149.50, 1000 lb. — $159.50. Heavily, simply built, with Push Button Control. Outstanding in CONCO'S complete line of hand-powered and electric Cranes, Hoists, Trolleys.

CONCO ENGINEERING WORKS

Div. of H. D. Conkey & Co. — 15 Grove St. — Mendota, Ill.

Builders Of Conco Torpedo Electric Hoist

For set screw security you can depend on

CLEVELAND SET SCREWS

Made to close tolerances of thread fit and lead—carefully case hardened—high tensile strength. All points, all sizes. Write for samples and prices.

CLEVELAND FASTENERS

The Cleveland Cap Screw Company

2917 EAST 79TH STREET • CLEVELAND 4, OHIO

Warehouses: Chicago, Philadelphia, New York, Los Angeles

MADE BY THE ORIGINATORS OF THE KAUFMAN PROCESS FOR GREATER STRENGTH AND ACCURACY

PRICES

WELDED PIPE AND TUBING

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

(F.o.b. Pittsburgh only on wrought pipe) Base Price—$200 per Net Ton

	Black	Galv.
Steel (Butt Weld)		
⅛ in.	63⅓	51
¼ in.	66⅔	55
⅜ to 3 in.	68⅓	57⅓
Wrought Iron (Butt Weld)		
⅛ in.	24	3⅓
¼ in.	30	10
⅜ and 1¼ in.	34	16
1½ in.	38	18⅓
2 in.	37⅓	18
Steel (Lap Weld)		
2 in.	61	49⅓
2½ and 3 in.	64	52⅓
3½ to 6 in.	66	54⅓
Wrought Iron (Lap Weld)		
2 in.	30⅓	12
2½ to 3½ in.	31⅓	14⅓
4 in.	33⅓	16
4½ to 8 in.	32⅓	17
Steel (Butt, extra strong, plain ends)		
⅛ in.	61⅓	50⅓
¼ in.	65⅓	54⅓
⅜ to 3 in.	67	57
Wrought Iron (Same as Above)		
⅛ in.	25	6
¼ in.	31	12
⅜ to 2 in.	38	19⅓
Steel (Lap, extra strong, plain ends)		
2 in.	59	48⅓
2½ and 3 in.	63	52⅓
3½ to 6 in.	66⅓	56
Wrought Iron (Same as Above)		
2 in.	33⅓	15⅓
2½ to 4 in.	39	22⅓
4½ to 6 in.	37⅓	21

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or $4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or $2 a ton higher on all butt weld.

CAST IRON WATER PIPE

	Per Net Ton
6-in. and larger, del'd Chicago	$54.00
6-in. and larger, del'd New York	52.30
6-in. and larger, Birmingham	46.00
6-in. and larger f.o.b. cars, San Francisco or Los Angeles	69.40
6-in. and larger f.o.b. cars, Seattle	71.20

Class "A" and gas pipe, $3 extra; 4-in. pipe is $3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons or over, 6-in. and larger is $46 at Birmingham and $53.80 delivered Chicago, $59.40 at San Francisco and Los Angeles, and $70.20 at Seattle. Delivered prices do not reflect new 3 per cent tax on freight rates.

BOILER TUBES

Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes, Minimum Wall. Net base prices per 100 ft. f.o.b. Pittsburgh, in carload lots.

	Seamless Cold Drawn	*Seamless Hot Rolled*	*Lap Weld, Hot Rolled*
2 in. o.d. 13 B.W.G.	15.03	13.04	12.38
2½ in. o.d. 12 B.W.G.	20.21	17.54	16.58
3 in. o.d. 12 B.W.G.	22.48	19.50	18.38
3½ in. o.d. 11 B.W.G.	28.37	24.62	23.18
4 in. o.d. 10 B.W.G.	35.20	30.54	28.64

(Extras for less carload quantities)

40,000 lb. or ft., and over	Base
30,000 lb. or ft. to 39,999 lb. or ft.	5%
20,000 lb. or ft. to 29,999 lb. or ft.	10%
10,000 lb. or ft. to 19,999 lb. or ft.	20%
5,000 lb. or ft. to 9,999 lb. or ft.	30%
2,000 lb. or ft. to 4,999 lb. or ft.	45%
Under 2,000 lb. or ft.	65%

WIRE PRODUCTS

To the trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham, Duluth

	Basing Points Named	Pacific Coast Basing Points†
	Base per Keg	
Standard wire nails	$2.55	$3.05
Coated nails	2.55	3.05
Cut nails, carloads	3.85	....
	Base per 100 Lb.	
Annealed fence wire	$3.05	$3.55
Annealed galv. fence wire	3.40	3.90
	Base Column	
Woven wire fence*	$0.67	$0.85
Fence posts, carloads	.69	.86
Single loop bale ties	.59	.84
Galvanized barbed wire**	.70	.80
Twisted barbless wire	.70	....

*15½ gage and heavier. **On 80-rod spools in carload quantities.
†Prices subject to switching or transportation charges.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts
(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Machine and Carriage Bolts:
Base discount less case lots

	Per Cent Off List
⅛ in. & smaller x 6 in. & shorter	65½
9/16 & ⅝ in. x 6 in. & shorter	63½
¾ to 1 in. x 6 in. & shorter	61
1⅛ in. and larger, all lengths	59
All diameters over 6 in. long	59
Lag, all sizes	62
Plow bolts	65

Nuts, Cold Punched or Hot Pressed:
(Hexagon or Square)

½ in. and smaller	62
9/16 to 1 in. inclusive	59
1⅛ to 1½ in. inclusive	57
1⅝ in. and larger	56

On above bolts and nuts, excepting plow bolts, additional allowance of 10 per cent for full container quantities. There is an additional 5 per cent allowance for carload shipments.

Semi-Fin. Hexagon Nuts	U.S.S.	S.A.E.
Base discount less keg lots		
7/16 in. and smaller	..	64
½ in. and smaller	62	..
½ in. through 1 in.	..	60
9/16 in. to 1 in.	59	..
1⅛ in. through 1½ in.	57	58
1⅝ in. and larger	56	..

In full keg lots, 10 per cent additional discount.

Stove Bolts *Consumer*

Packages, nuts loose	71 and 10
In packages, with nuts attached	71
In bulk	80

On stove bolts freight allowed up to 65c. per 100 lb. based on Cleveland Chicago, New York on lots of 200 lb. or over.

Large Rivets
(½ in. and larger)

	Base per 100 lb.
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	$3.75

Small Rivets
(7/16 in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh, Cleveland Chicago, Birmingham	65 and 5

Cap and Set Screws *Consumer*

	Per Cent Off List
Upset full fin. hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in.	64
Upset set screws, cup and oval points	71
Milled studs	46
Flat head cap screws, listed sizes	36
Fillister head cap, listed sizes	51

Freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.

ROOFING TERNE PLATE

(F.o.b. Pittsburgh, 112 Sheets)

	20x14 in.	20x28 in.
8-lb. coating I.C.	$6.00	$12.00
15-lb. coating I.C.	7.00	14.00
30-lb. coating I.C.	7.50	15.00

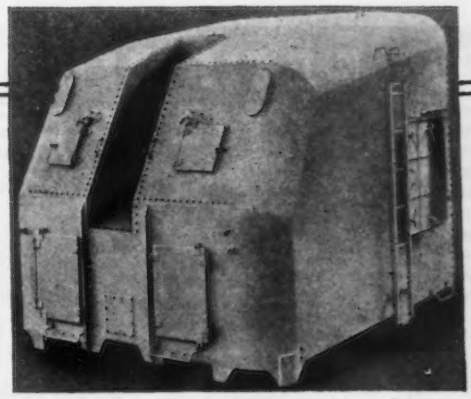
"99"

Just one year shy of a century of springmaking · · and believe us, we've seen a lot of life · · · panics · · · wars · · · boom times · · · bum times · · but we believe in our country and our cause · · · and we stick to our knitting because we want to be

"Everybody's Spring Dept."

DUNBAR
BROTHERS CO.
DIV. OF ASSOCIATED SPRING CORP.
BRISTOL, CONN.

SPRINGS · WIRE FORMS · SMALL STAMPINGS



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Heavy Plate or Light Sheet—

Call **BRANDT of Baltimore**

for Precision in Heavy Plate and Sheet Steel Work

Here is an 8½ acre plant . . . with the most modern equipment for shearing, rolling, forming, welding and completely fabricating ferrous, non-ferrous and alloy metals to your specifications . . . from the lightest gauge up to and including 1¼" mild steel or ¾" armor plate. Extensive war contracts necessarily limit our present acceptance of new business for immediate delivery. For information, address: Charles T. Brandt, Inc., Baltimore-30, Maryland.

BRANDT of Baltimore—*Craftsmen in Metal Since 1890*

PIG IRON

All prices set in bold face type are maxima established by OPA on June 24, 1941. Other domestic prices (in italics) are delivered quotations per gross ton computed on the basis of the official maxima. Delivered prices do not reflect 3 per cent tax on freight rates.

	No. 2 Foundry	Basic	Bessemer	Malleable	Low Phosphorus	Charcoal
Boston	*$25.50*	*$25.00*	*$26.50*	*$26.00*	.....	.....
Brooklyn	*27.50*	*27.00*	.....	*28.00*	.....	.....
Jersey City	*26.53*	*26.03*	*27.53*	*27.03*	.....	.....
Philadelphia (4)	*25.84*	*25.34*	*26.84*	*26.34*	*$30.74*	.....
Bethlehem, Pa.	25.00	24.50	26.00	25.50	.....	.....
Everett, Mass.	25.00	24.50	26.00	25.50	.....	.....
Swedeland, Pa.	25.00	24.50	26.00	25.50	.....	.....
Steelton, Pa.	.....	24.50	.....	.....	29.50	.....
Birdsboro, Pa. (3)	25.00	24.50	26.00	25.50	29.50	.....
Sparrows Point, Md.	25.00	24.50	.....	.....	.....	.....
Erie, Pa.	24.00	23.50	25.00	24.50	.....	.....
Neville Island, Pa.	24.00	23.50	24.50	24.00	.....	.....
Sharpsville, Pa. (1)	24.00	23.50	24.50	24.00	.....	.....
Buffalo	24.00	23.50	25.00	24.50	29.50	.....
Cincinnati, Ohio	*25.11*	*24.61*	.....	*25.11*	.....	.....
Canton, Ohio	*25.39*	*24.89*	*25.89*	*25.39*	*32.69*	.....
Mansfield, Ohio	*25.94*	*25.44*	*26.44*	*25.94*	*32.86*	.....
St. Louis	*24.50*	*24.50*	.....	.....	.....	.....
Chicago	24.00	23.50	24.50	24.00	*35.46*	.....*$37.34*
Granite City, Ill.	24.00	23.50	24.50	24.00	.....	.....
Cleveland	24.00	23.50	24.50	24.00	*32.42*	.....
Hamilton, Ohio	24.00	23.50	.....	24.00	.....	.....
Toledo	24.00	23.50	24.50	24.00	.....	.....
Youngstown	24.00	23.50	24.50	24.00	*32.42*	.....
Detroit	24.00	23.50	24.50	24.00	.....	.....
Lake Superior fc.	.....	.....	.....	.....	.....	34.00
Lyles, Tenn. fc. (2)	.....	.....	.....	.....	.....	33.00
St. Paul	*26.63*	26.13	*27.13*	*26.63*	*39.80*	.....
Duluth	24.50	24.00	25.00	24.50	.....	.....
Birmingham	20.38	19.00	25.00	.....	.....	.....
Los Angeles	*26.95*	.....	.....	.....	.....	.....
San Francisco	*26.95*	.....	.....	.....	.....	.....
Seattle	*26.95*	.....	.....	.....	.....	.....
Provo, Utah	22.00	21.50	.....	.....	.....	.....
Montreal	*27.50*	*27.50*	.....	*28.00*	.....	.....
Toronto	*25.50*	*25.50*	.....	*26.00*	.....	.....

GRAY FORGE IRON: Valley or Pittsburgh furnace $23.50

(1) Pittsburgh Coke & Iron Co. (Sharpsville, Pa., furnace only) and the Struthers Iron and Steel Co., Struthers, Ohio, may charge 50c. a ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable. Struthers Iron and Steel Co. may add another $1.00 per gross ton for iron from Struthers, Ohio, plant.

(2) Price shown is for low-phosphorous iron; high phosphorous sells for $28.50 at the furnace.

(3) E. & G. Brooke Co. Birdsboro, Pa., permitted to charge $1.00 per ton extra.

(4) Pittsburgh Ferromanganese Co. (Chester furnace only) may charge $2.25 a ton over maximum basing point prices.

Basing point prices are subject to switching charges; Silicon differentials (not to exceed 50c. a ton for each 0.25 per cent silicon content in excess of base grade which is 1.75 to 2.25 per cent); Phosphorus differentials, a reduction of 38c. per ton for phosphorus content of 0.70 per cent and over; Manganese differentials, a charge not to exceed 50c. per ton for each 0.50 per cent manganese content in excess of 1.00 per cent. Effective March 3, 1943, $2 per ton extra may be charged for 0.5 to 0.75 per cent nickel content and $1 per ton extra for each additional 0.25 per cent nickel.

METAL POWDERS

Prices are based on current market prices of ingots plus a fixed figure. F.o.b. shipping point, c. per lb., ton lots.

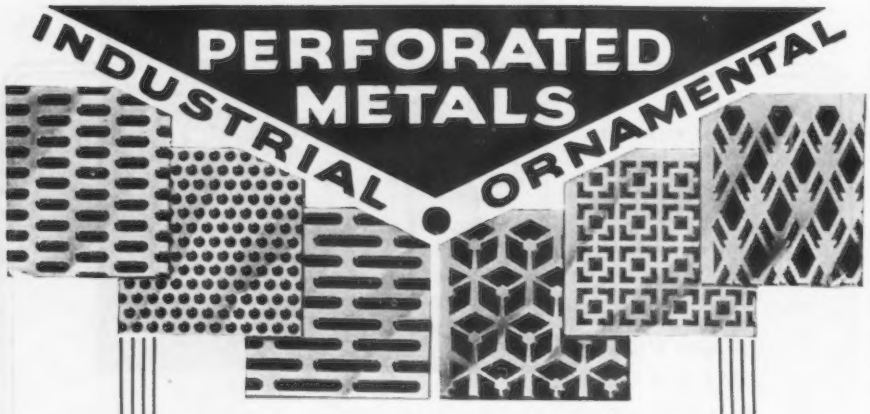
Copper, electrolytic, 150 and 200 mesh	21⅛ to 23½c.
Copper, reduced, 150 and 200 mesh	20½ to 25½c.
Iron, commercial, 100 and 200 mesh, 96 + % Fe	13½ to 15c.
Iron, crushed, 200 mesh and finer, 90 + % Fe	4c.
Iron, hydrogen reduced, 300 mesh and finer, 98½ + % Fe	63c.
Iron, electrolytic, unannealed, 300 mesh and coarser, 99 + % Fe	30 to 33c.
Iron, electrolytic, annealed minus 100 mesh, 99 + % Fe	42c.
Iron, carbonyl, 300 mesh and finer, 98-99.8 + % Fe	90c.
Aluminum, 100 and 200 mesh	*23 to 27c.
Antimony, 100 mesh	20.6c.
Cadmium, 100 mesh	$1
Chromium, 150 mesh	$1.03
Lead, 100, 200 & 300 mesh, 11½ to 12½c.	
Manganese, 150 mesh	51c.
Nickel, 150 mesh	51½c.
Solder powder, 100 mesh, 8½c. plus metal	
Tin, 100 mesh	58½c.
Tungsten metal powder, 98%-99%, any quantity, per lb.	$2.60
Molybdenum power, 99%, in 200-lb. kegs, f.o.b. York, Pa., per lb.	$2.60
Under 100 lb.	$3.00

*Freight allowed east of Mississippi.

COKE

	Net Ton
Furnace, beehive (f.o.b. oven)	
Connellsville, Pa.	$7.00*
Foundry, beehive (f.o.b. oven)	
Fayette Co., W. Va.	8.10
Connellsville, Pa.	8.25
Foundry, By-Product	
Chicago, del'd	13.35
Chicago, f.o.b.	12.60
New England, del'd	14.25
Kearny, N. J., f.o.b.	12.65
Philadelphia, del'd	12.88
Buffalo, del'd	13.00
Portsmouth, Ohio, f.o.b.	11.10
Painesville, Ohio, f.o.b.	11.75
Erie, del'd	12.75
Cleveland, del'd	12.80
Cincinnati, del'd	12.85
St. Louis, del'd	13.85
Birmingham, del'd	10.50

*Hand drawn ovens using trucked coal permitted to charge $7.75 per ton plus transportation charges. **Mo., Ala., and Tenn. producers—$13.35.



ANY METAL • ANY PERFORATION

Industrial—Well balanced screens of excellent material and workmanship to assure maximum screen production combined with durability.

Ornamental—Approved patterns and finishes including many exclusive and characteristic designs for grilles and furniture. We invite your inquiries.

The Harrington & King PERFORATING Co.

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Eastern Office, 114 Liberty Street, New York 6, N. Y.

PRICES

REFRACTORIES
(F.o.b. Works)

Fire Clay Brick	*Per 1000*
Super-duty brick, St. Louis	$64.60
First quality, Pa., Md., Ky., Mo., Ill.	51.30
First quality, New Jersey	56.00
Sec. quality, Pa., Md., Ky., Mo., Ill.	46.55
Second quality, New Jersey	51.00
No. 1, Ohio	43.00
Ground fire clay, net ton	7.60
Silica Brick	
Pennsylvania and Birmingham	$51.30
Chicago District	58.90
Silica cement, net ton (Eastern)	9.00
Chrome Brick	*Per Net Ton*
Standard, chemically bonded, Balt., Plymouth Meeting, Chester	$54.00
Magnesite Brick	
Standard, Balt. and Chester	$76.00
Chemically bonded, Baltimore	65.00
Grain Magnesite	
Domestic, f.o.b. Balt. and Chester in sacks (carloads)	$43.48
Domestic, f.o.b. Chewelah, Wash. (in bulk)	22.00

RAILS, TRACK SUPPLIES
(F.o.b. Mill)

Standard rails, heavier than 60 lb., No. 1 O.H., gross ton $40.00
Angle splice bars, 100 lb. 2.70

(F.o.b. Basing Points)	*Per Gross Ton*
Light rails (from billets)	$40.00
Light rails (from rail steel)	39.00

	Base per Lb.
Cut spikes	3.00c.
Screw spikes	5.15c.
Tie plates, steel	2.15c.
Tie plates, Pacific Coast	2.30c.
Track bolts	4.75c.
Track bolts, heat treated, to railroads	5.00c.
Track bolts, jobbers discount	63-5

Basing points, light rails, Pittsburgh, Chicago, Birmingham; cut spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo. Cut spikes alone—Youngstown, Lebanon, Pa., Richmond, Oregon and Washington ports, add 25c.

CORROSION AND HEAT-RESISTING STEEL
(Per lb. base price, f.o.b. Pittsburgh)

Chromium-Nickel Alloys

	No. 304	No. 302
Forging billets	21.25c.	20.40c.
Bars	25.00c.	24.00c.
Plates	29.00c.	27.00c.
Structural shapes	25.00c.	24.00c.
Sheets	36.00c.	34.00c.
Hot rolled strip	23.50c.	21.50c.
Cold rolled strip	30.00c.	28.00c.
Drawn wire	25.00c.	24.00c.

Straight-Chromium Alloys

	No. 410	No. 430	No. 442	No. 446
F.Billets	15.725c.	16.15c.	19.125c.	23.375c.
Bars	18.50c.	19.00c.	22.50c.	27.50c.
Plates	21.50c.	22.00c.	25.50c.	30.50c.
Sheets	26.50c.	29.00c.	32.50c.	36.50c.
Hot strip	17.00c.	17.50c.	24.00c.	35.00c.
Cold strip	22.00c.	22.50c.	32.00c.	52.00c.

Chromium-Nickel Clad Steel (20%)

	No. 304
Plates	18.00c.*
Sheets	19.00c.

*Includes annealing and pickling.

ELECTRICAL SHEETS
(Base, f.o.b. Pittsburgh)

	Per Lb.
Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
Motor	4.95c.
Dynamo	5.65c.
Transformer 72	6.15c.
Transformer 65	7.15c.
Transformer 58	7.65c.
Transformer 52	8.45c.

F.o.b. Granite City, add 10c. per 100 lb. on field grade to and including dynamo. Pacific ports add 75c. per 100 lb. on all grades.

"HERCULES" RED-STRAND WIRE ROPE

You Can Depend On "Hercules" (Red Strand) Wire Rope

Highlights of Quality

1. Acid Open-Hearth Steel Wire
2. Rigid Tests and Inspections
3. Correct Manufacturing Methods
4. Furnished in both the Round and Flattened Strand constructions, in either Standard or Preformed Type.

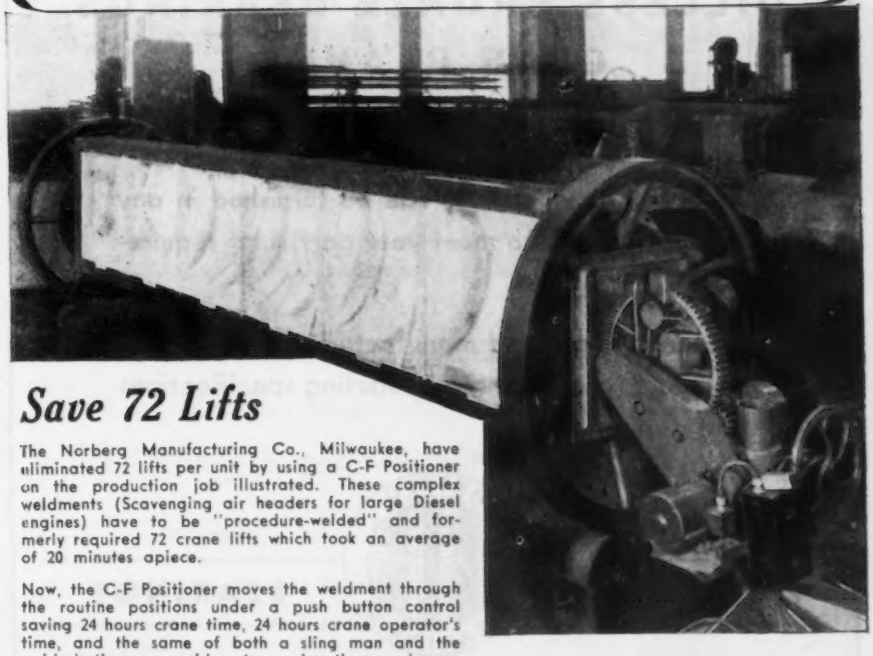
• • Results are what count, and the performance record of this wire rope continues to make and hold friends.

There is no guess work when you use "HERCULES" (Red-Strand) Wire Rope. It is designed and built to do specific jobs better . . . safer . . . more economically. If you will tell us how you use wire rope, we shall be glad to suggest the construction and type most suitable for your conditions.

MADE ONLY BY
A. LESCHEN & SONS ROPE CO.
WIRE ROPE MAKERS — ESTABLISHED 1857
5909 KENNERLY AVENUE — ST. LOUIS, MISSOURI, U. S. A.

NEW YORK • • • 90 West Street
CHICAGO • • 810 W. Washington Blvd.
DENVER • • • 1554 Wazee Street
SAN FRANCISCO • • 520 Fourth Street
PORTLAND • • 914 N. W. 14th Avenue
SEATTLE • • 3410 First Avenue South

C-F POSITIONERS



Save 72 Lifts

The Norberg Manufacturing Co., Milwaukee, have eliminated 72 lifts per unit by using a C-F Positioner on the production job illustrated. These complex weldments (Scavenging air headers for large Diesel engines) have to be "procedure-welded" and formerly required 72 crane lifts which took an average of 20 minutes apiece.

Now, the C-F Positioner moves the weldment through the routine positions under a push button control saving 24 hours crane time, 24 hours crane operator's time, and the same of both a sling man and the welder's time per weldment . . . in other words saving three man-days and one crane-day on each header produced.

C-F Positioners come in 6 sizes—capacities to 30,000 lb. All are pedestal mounted, rotate 360° and tilt to 135° beyond horizontal.

Write for Bulletin WP-22

CULLEN-FRIESTEDT CO., 1303 S. Kilbourn Ave., Chicago 23, U.S.A.

HOW TO LOAD & UNLOAD FREIGHT CARS

KRANE KAR — Mobile Swing Boom Crane

Krane Kar transports the loads to and from the cars. You don't waste time maneuvering the vehicle . . . just operate the live boom from side to side with load on the hook. Krane Kar reaches into the farthest recesses of the car to position or remove loads. For box, flat, or gondola cars.

USERS: Bethlehem Steel; Consolidated Steel; Columbia Steel; Pullman Standard Car Mfg. Co.; Ajax Steel & Forge; Boeing Airplane Co.; General Motors; Basic Magnesium; etc.

2½, 5, AND 10 TON CAPACITIES

Krane kar

SILENT HOIST WINCH & CRANE CO., 851 63RD ST., BROOKLYN, N.Y.

BRONZE BEARINGS
OILLESS BRONZE BEARINGS
GEAR BLANKS
MACHINED BRONZE PARTS

S & H Bronze Bearings can be furnished in any size or quantity to meet your particular requirements.

Our equipment and manufacturing methods enable us to meet the most exacting specifications and design.

BETTER B BEARINGS

INDUSTRIAL BEARINGS

S. & H. Bearing and Manufacturing Co., Inc.
340-344 North Avenue, East
Cranford New Jersey

PRICES

Ferromanganese

78-82% Mn, maximum contract base price per gross ton, lump size, f.o.b. car at Baltimore, Bethlehem, Philadelphia, New York, Birmingham, Rockdale, Rockwood, Tenn.

Carload lots (bulk)	$135.00
Carload lots (packed)	141.00
Less ton lots (packed)	148.50

Premium, $1.70 for each 1% above 82% Mn; penalty, $1.70 for each 1% below 78%.

Manganese Metal

Contract basis, lump size, per lb of metal, f.o.b. shipping point with freight allowed. Spot sales add 2c. per lb.

96-98% Mn, .2% max. C, 1% max. Si, 2% max. Fe.	
Carload, bulk	36c.
L.c.l. lots	38c.
95-97% Mn, .2% max. C, 1.5% max. Si, 2.5% max. Fe.	
Carload, bulk	34c.
L.c.l. lots	35c.

Spiegeleisen

Maximum base, contract prices, per gross ton, lump, f.o.b. Palmerton, Pa.

	16-19% Mn 3% max. Si	19-21% Mn 3% max. Si
Carloads	$35.00	$36.00
Less ton	47.50	48.50

Electric Ferrosilicon

OPA maximum base price cents per lb contained Si, lump size in carlots, f.o.b. shipping point with freight allowed to destination.

	Eastern Zone	Central Zone	Western Zone
50% Si	6.65c.	7.10c.	7.25c.
75% Si	8.05c.	8.20c.	8.75c.
80-90% Si	8.90c.	9.05c.	9.55c.
90-95% Si	11.05c.	11.20c.	11.65c.

Spot sales add: .45c per lb. for 50% Si, .3c. per lb. for 75% Si, .25c. per lb for 80-90% and 90-95% Si.

Silvery Iron

(Per Gross Ton, base 6.00 to 6.50 Si)

F.o.b. Jackson, Ohio	$29.50*
Buffalo	30.75*

For each additional 0.50% silicon add $1 a ton. For each 0.50% manganese over 1% add 50c. a ton. Add $1 a ton for 0.75% phosphorous or over.

*OPA price established 6-24-41.

Bessemer Ferrosilicon

Prices are $1 a ton above silvery iron quotations of comparable analysis.

Silicon Metal

OPA maximum base price per lb. of contained Si, lump size, f.o.b. shipping point with freight allowed to destination, for l.c.l. above 2000 lb., packed. Add .25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
96% Si, 2% Fe	13.10c.	13.55c.	16.50c.
97% Si, 1% Fe	13.45c.	13.90c.	16.80c.

Ferrosilicon Briquets

OPA maximum base price per lb. of briquet, bulk, f.o.b. shipping point with freight allowed to destination. Approximately 40% Si. Add .25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
Carload, bulk	3.35c.	3.50c.	3.65c.
2000 lb.-carload	3.8c.	4.2c.	4.25c.

Silicomanganese

Contract basis lump size, per lb. of metal, f.o.b. shipping point with freight allowed. Add .25c. for spot sales. 65-70% Mn, 17-20% Si, 1.5% max. C.

Carload, bulk	6.05c.
2000 lb. to carload	6.70c.
Under 2000 lb.	6.90c.
Briquets, contract, basis carlots, bulk freight allowed, per lb.	5.80c.
2000 lb. to carload	6.30c.
Less ton lots	6.55c.

Ferrochrome

(65-72% Cr, 2% max. Si)

OPA maximum base contract prices per lb. of contained Cr, lump size in carload lots, f.o.b. shipping point, freight allowed to destination. Add .25c. per lb. contained Cr for spot sales.

	Eastern Zone	Central Zone	Western Zone
0.06% C	23.00c.	23.40c.	24.00c.
0.10% C	22.50c.	22.90c.	23.50c.
0.15% C	22.00c.	22.40c.	23.00c.
0.20% C	21.50c.	21.90c.	22.50c.
0.50% C	21.00c.	21.40c.	22.00c.
1.00% C	20.50c.	20.90c.	21.50c.
2.00% C	19.50c.	19.90c.	21.00c.
66-71% Cr, 4-10% C	13.00c.	13.40c.	14.00c.

PRICES

Other Ferroalloys

Ferrotungsten, Standard grade, lump or ¼X down, packed, f.o.b. plant at Niagara Falls, New York, Washington, Pa., York, Pa., per lb. contained tungsten. 10,000 lb. of more... $1.90

Ferrovanadium, 35-55%, contract basis, f.o.b. producer's plant, usual freight allowances, per lb. contained Va.
- Open Hearth $2.70
- Crucible $2.80
- Primos $2.90

Cobalt, 97% min., keg packed, contract basis, f.o.b. producer's plant, usual freight allowances, per lb. of cobalt metal $1.50

Vanadium pentoxide, 88%-92% V_2O_5 technical grade, contract basis, any quantity, per lb. contained V_2O_5. Spot sales add 5c. per lb. contained V_2O_5 ..... $1.10

Ferroboron, contract basis, 17.50% min. Bo, f.o.b. producer's plant with usual freight allowances, per lb. of alloy.
- 2000 lb. to carload $1.20
- Under 2000 lb. 1.30

Silcaz No. 3, contract basis, f.o.b. producer's plant with usual freight allowances, per lb. of alloy. (Pending OPA approval)
- Carload lots ..... 25c.
- 2000 lb. to carload ..... 26c.

Silvaz No. 3, contract basis, f.o.b. producer's plant with freight allowances, per lb. of alloy (Pending OPA approval)
- Carload lots ..... 58c.
- 2000 lb. to carload ..... 59c.

Grainal, f.o.b. Bridgeville, Pa., freight allowed 50 lb. and over, max. based on rate to St. Louis
- No. 1 ..... 87.5c.
- No. 6 ..... 60c.
- No. 79 ..... 45c.

Bortram, f.o.b. Niagara Falls
- Ton lots, per lb. ..... 45c.
- Less ton lots, per lb. ..... 50c.

Ferrocolumbium, 50-60%, contract basis, f.o.b. plant with freight allowances, per lb contained Cb.
- 2000 lb. lots $2.25
- Under 2000 lb. lots $2.30

Ferrotitanium, 40%-45%, f.o.b. 0.10c. max. Niagara Falls, N. Y., ton lots, per lb. contained Ti... $1.23
- Less ton lots $1.25

Ferrotitanium, 20%-25%, 0.10 C max., ton lots, per lb. contained titanium $1.35
- Less ton lots $1.40

High-carbon ferrotitanium, 15%-20%, 6%-8% carbon, contract basis, f.o.b. Niagara Falls, N. Y., freight allowed East of Mississippi River, North of Baltimore and St. Louis, per carload $142.50

Ferrophosphorus, 18% electric or blast furnace, f.o.b. Anniston, Ala., carlots, with $3 unitage freight equaled with Rockdale, Tenn., per gross ton $58.50

Ferrophosphorus, electrolytic 23-26%, carlots, f.o.b. Monsanto (Siglo), Tenn., $3 unitage freight equalized with Nashville, per gross ton $75.00

Ferromolybdenum, 55-75%, f.o.b. Langeloth, Washington, Pa., any quantity, per lb. contained Mo. 95c.

Calcium molybdate, 40%-45%, f.o.b. Langeloth and Washington, Pa., any quantity, per lb. contained Mo ..... 80c.

Molybdenum oxide briquettes, 48%-52% Mo, f.o.b. Langeloth, Pa., per lb. contained Mo ..... 80c.

Molybdenum oxide, in cans, f.o.b. Langeloth and Washington, Pa., per lb. contained Mo ..... 80c.

Zirconium, 35-40%, contract basis, f.o.b. producer's plant with freight allowances, per lb. of alloy. Add ¼c. for spot sales
- Carload lots ..... 14c.

Zirconium, 12-15%, contract basis, lump, f.o.b. plant usual freight allowances, per lb. of alloy
- Carload, bulk ..... 4.6c.

Alsifer (approx. 20% Al, 40% Si and 40% Fe), contract basis, f.o.b. Niagara Falls, carload, bulk ..... 5.75c.
- Ton lots ..... 7.25c.

Simanal (approx. 20% Si, 20% Mn, 20% Al), contract basis, f.o.b. Philo, Ohio, with freight not to exceed St. Louis rate allowed, per lb.
- Car lots ..... 8.75c.
- Ton lots ..... 9.25c.

FOR ALL TYPES of INDUSTRIAL FURNACES

Open Hearth Oil Burners

Fig. P-813-B

The Type S. A. Model QH Oil Burner provides the ideal flame for firing open hearth furnaces with any grade of fuel oil or tar, using saturated or superheated steam, or compressed air for atomization.

Its venturi throat and internal mixing chamber, (see illustration below) permits a wide range in capacity and flame velocity. Steam consumption is low. Continuous operation without clogging or need for cleaning.

Nozzle is extendable, with or without water cooled jacket. Sizes available to give capacities up to 725 gallons per hour.

For more information about these burners write for Bulletin No. 21.

NATIONAL AIROIL FUEL OIL - GAS BURNERS

Steam Atomizing Oil Burners—Mechanical Pressure Atomizing Oil Burners—Low Air Pressure Oil Burners—Motor-driven Rotary Oil Burners—Industrial Gas Burners—Combination Gas and Oil Burners—Fuel Oil Pumping Units—Fuel Oil Heaters—Fuel Oil Strainers and other accessories.

Cross Section of Type SA Oil Burner

NATIONAL AIROIL BURNER COMPANY, INCORPORATED

1271 East Sedgley Ave., Philadelphia 34, Pa.

ESTABLISHED 1912 *INCORPORATED 1917*

A.I.S.I. HY-TEN S.A.E. N.E.

ALLOY STEELS FOR VICTORY

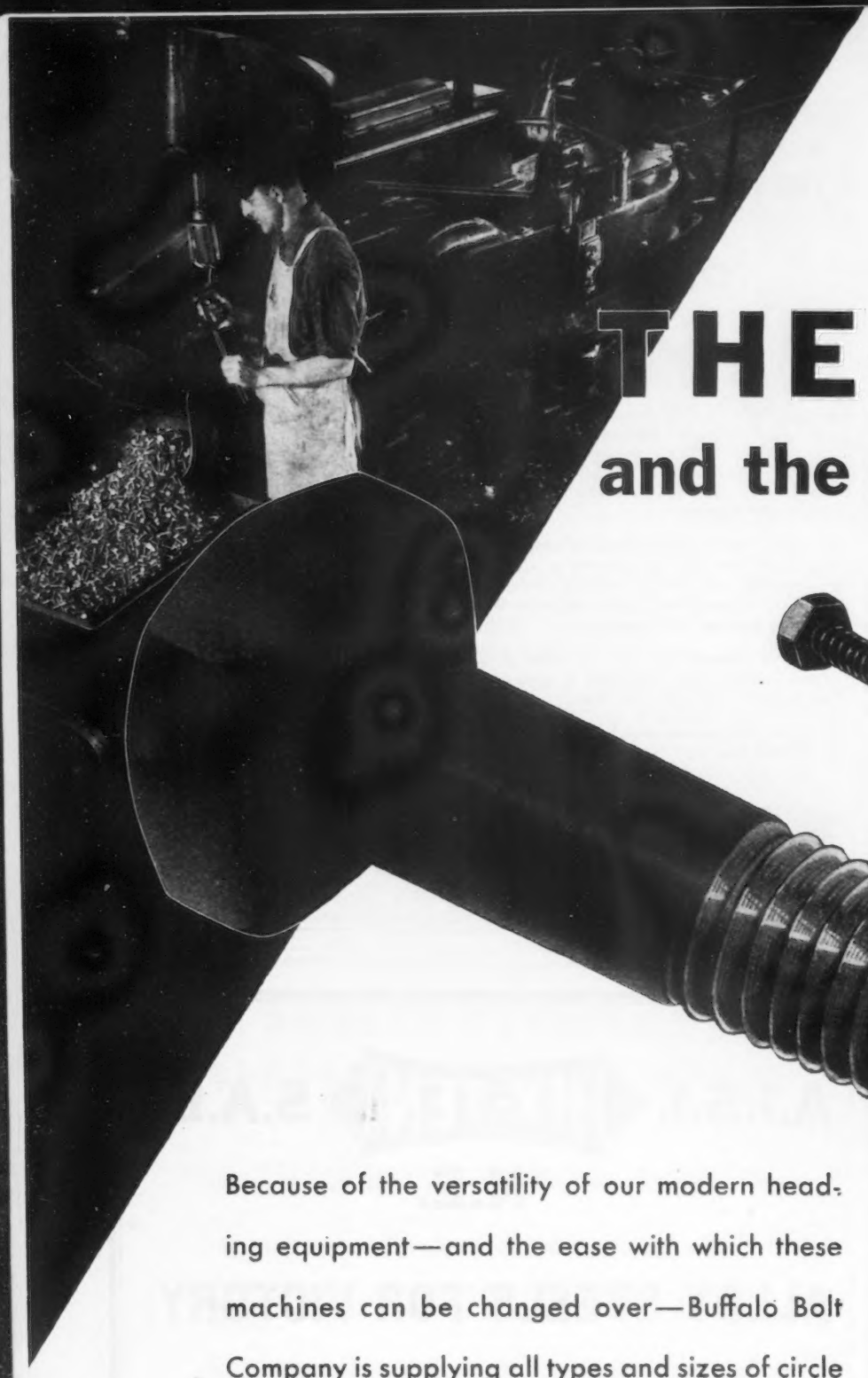
Scientifically selected to conserve critical alloys and meet the requirements of the AIRCRAFT, ORDNANCE, and MACHINE TOOL industries.

Complete "EARMARKED" stocks of Aircraft alloy steels at Buffalo and Detroit.

WHEELOCK, LOVEJOY & CO., INC.

126 Sidney Street Cambridge 39, Mass.

Cleveland 14, Chicago 23, Newark 5, Detroit 3, Buffalo 10, Cincinnati 32



One of the modern Buffalo Bolt machi
—capacity 4200 pieces per hour.

THE LONG

and the short of it

Because of the versatility of our modern heading equipment—and the ease with which these machines can be changed over—Buffalo Bolt Company is supplying all types and sizes of circle "B" fasteners for every sinew of war—from the tiniest cap screw to the heaviest battleship bolt.

BUFFALO BOLT

COMPANY

NORTH TONAWANDA, N. Y.

SALES OFFICES IN PRINCIPAL CITIES